Statistics and Indicators on the Labour market in the eEconomy

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Measuring the Information Society

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Foreword

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To most policymakers and social scientists, as well as to the general public, statistics are usually thought of as a taken-for-granted feature of the information landscape. It is assumed that if changes are taking place in society this will somehow, somewhere, be captured by somebody. The details of exactly how these statistics may be constructed are generally seen as somewhat boring and over-technical. 'Don't bother with the detailed explanation, just give me the basic numbers' is a request that is heard over and over again by academic researchers and government statisticians faced with a request from a politician or a journalist for information on a new trend that has momentarily captured the headlines.

In the economic and social upheavals that have accompanied the development in recent years of what is often described as a global knowledge-based economy such requests have multiplied. How many teleworkers are there? How many people work in call centres? How many companies practice offshore outsourcing and how many jobs are at risk? How many people use computers at work? How many work in virtual teams? How rapidly are these trends growing? Which countries are leading these developments and which are lagging behind? Is work really becoming more flexible? And are workers really becoming more mobile? Such questions are asked every day in parliaments, television studios and postgraduate seminars around the world. But how can they be answered? It is rapidly becoming apparent that actually nobody has precise answers to these questions. The changes accompanying the introduction of information and communications technologies (ICTs) have been so fundamental that they have rendered many of the traditional statistical categories inadequate to capture them. For the first time in many decades the statisticians seem to be stumped.

Part of the problem is that the traditional units of analysis have changed. When more and more people work part-time or intermittently, perhaps on temporary or freelance contracts, even the concept of a 'job' may be problematic. When film companies merge with television companies which merge with games companies which merge with software companies which merge with record companies which merge with publishing companies which merge with book-selling companies which merge with Internet *e*Commerce companies the concept of the 'sector' becomes at best blurred and at worst completely inadequate. When workers are expected to multi-task, to be prepared to constantly retrain, to have generic IT skills, and are employed on the basis of their 'soft' communications and management skills, what has happened to the concept of the 'occupation'? Another aspect of the problem is the sheer speed of change. In a highly competitive global environment, many companies are involved in what amounts to a continuous process of restructuring. Departments which were organised last month on the basis of product groups may now be reorganised on the basis of regional markets which may in turn give way in a few months time to a structure based on whether the customers are businesses or individuals, or on the languages they speak. What was outsourced last year may be brought back in-house this year, or transferred to a remote branch. Strategic alli-

ances may break up so that yesterday's ally is tomorrow's rival, whilst mergers and demergers, takeovers and sell-offs seem to occur on an almost daily basis. In such a landscape, how much change should be dismissed as statistical 'noise' and how much needs to be taken seriously? If it is to be captured, which dimensions should be recorded and how can these be compared internationally? Such examples could be multiplied many times. They are mentioned here in order to illustrate the general point that, indisputably, the development of an Information Society has presented a fundamental challenge to statistical systems.

This problem has not gone entirely unnoticed and in 2000 the European Commission announced a call for proposals for research projects to address the challenge of developing indicators for the Information Society, under its Fifth Framework Programme, in a joint initiative of its Information Society Directorate General (DG Infsoc) and Eurostat (the European Union's official statistical agency). This book presents the work of one of the projects funded under this initiative, the STILE project (the acronym stands for 'Statistics and indicators on the labour market in the *e*Economy'). This project bridged a number of gaps. Under the leadership of HIVA[1] of the Katholieke Universiteit Leuven, it brought together research partners from academic research institutes (OSA[2] in the Netherlands and the Institute of Sociology in Hungary), national statistics institutes - NSIs (in Ireland and Hungary), independent research institutes (IRES[3] in Italy, CAMIRE[4] in Luxembourg and IES[5] in the UK), government-linked research institutes (IAB[6] in Germany) and independent research consultants (CTC[7] in Ireland and Joanne H. Pratt Associates in the United States). It also brought together in a series of national and international workshops and as research participants a wide range of statistics producers and users including the architects of three major employer panel surveys (in the Netherlands, Germany and Belgium), representatives of NSIs (in the Netherlands, the UK, Italy and Austria as well as the research partner NSIs in Hungary and Ireland) and representatives from international statistics bodies (including the OECD[8] and ILO[9] as well as Eurostat) as well as a broad sample of research users from the European Commission, government, academia, industry, labour and civil society.

This book reflects some of this diversity, bringing together contributions from members of the STILE team with those from external experts.

It opens with an introduction by Monique Ramioul and An Bollen of HIVA, explaining the approach of the STILE project and reflecting on its achievements. Next, the focus turns to employer-based surveys. Markus Promberger of IAB and Peter Ester and Amelia Román of OSA discuss the obstacles and opportunities on the road to cross-national convergence of European establishment surveys. As an illustration of the sorts of fine-grained results that can be achieved by comparing the results from two different national

1 Hoger Instituut voor de Arbeid/Higher Institute for Labour Studies.
2 Organisatie voor Strategisch Arbeidsmarktonderzoek/Institute for Labour Studies.
3 Istituto di Ricerche Economiche e Sociali.
4 CAMIRE Estadística y Análisis, S.L.
5 Institute for Employment Studies.
6 Institut für Arbeitsmarkt- und Berufsforschung.
7 Cork Teleworking Center.
8 Organisation for Economic Co-operation and Development.
9 International Labour Organization.

establishment surveys, Lutz Bellmann of IAB and Piet Allaart of OSA then compare employers' demand for part-time workers in Germany and the Netherlands.

The focus then shifts to occupational mobility. First, Anders Ekeland of NIFU STEP[10] in Norway offers some general reflections on mobility in the New Economy. This is followed by a cost benefit assessment of administrative databases and surveys in measuring labour market mobility by Mikael Åkerblom from Statistics Finland. Then Maarten Tielens of Steunpunt WAV[11] and Alex Stimpson of CAMIRE present a summary of STILE's work on occupational mobility in the information economy, comparing the efficacy of using results from the European Labour Force Survey with the use of administrative data from the Belgian Datawarehouse.

In the next section, the focus shifts again: Desirée van Welsum and Graham Vickery from the OECD give an overview of some of the difficulties of capturing the extent of offshore outsourcing using existing statistics and present the results of some attempts to do so. Referring to other research by the EMERGENCE project which has attempted to address the same problem, Ursula Huws of IES then presents the results of a STILE exercise designed to test the ways in which offshoreable activities are classified to existing sectoral and occupational codes by national statistics offices in Europe. This discussion of sectoral and occupational classification leads into the next section in which occupational profiling is the main focus.

Here, Ben Hövels of KBA[12] in the Netherlands provides a general critical overview of the process by which occupational profiles and the corresponding qualifications are constructed. This is followed by a presentation by An Bollen and Monique Ramioul from HIVA of the STILE project's work on European similarities and differences in the development of new occupations in a changing economic environment, drawing on research on the new occupations of website designers in the travel industry and call centre operatives providing technical support.

The final section of the book focuses on teleworking. First, Giovanna Altieri, Francesca della Ratta and Cristina Oteri of IRES present STILE's work on developing a standard module for measuring *e*Work in social surveys. Then, Joanne Pratt of Joanne H. Pratt Associates illustrates the value of this 'piggyback' survey concept by comparing the results of surveys in the United States, UK, Hungary, the Netherlands and Ireland in terms of what they can tell us about the characteristics of teleworkers in these countries. Finally, Csaba Makó and Miklós Illéssy, of the Institute of Sociology - Hungarian Academy of Sciences, interpret the results of some research on *e*Work in Hungary to demonstrate what it can tell us about the nature of transitional economies.

Whilst this book by no means covers the entire spectrum of statistical challenges posed by the development of a global knowledge-based society, we hope that it addresses at least some of the central issues raised by this development. By covering both individual-based and employer-based research instruments, administrative records and surveys, official statistics and academic enquiries it touches on most of the main methodologies currently used to generate statistics on labour and the *e*Economy. We also hope that it will succeed in focusing attention on the processes by which indicators are constructed,

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10 NIFU STEP - Studies in Innovation, Research and Education.

11 Steunpunt Werkgelegenheid-Arbeid-Vorming/Resource Center for Labour Market Research.

12 Kenniscentrum Beroepsonderwijs Arbeidsmarkt/Knowledge Center for Vocational Education and Labour Market.

through its analysis of a range of processes including the coding and classification of sectors, the development of occupational profiles and the formulation of questions for inclusion in employer and employee surveys. Finally we hope that it will contribute to the development of a constructive dialogue between statistics users and statistics producers in which all stakeholders realise that it is only by co-operation that they will break down any existing misapprehensions and mutual suspicions and thereby contribute to a process by which meaningful indicators can be produced that will combine simplicity of collection, comparability and cost-effectiveness on the one hand with robustness, usability and relevance on the other.

This book includes contributions both from STILE partners and from external experts, who provided very valuable additional insights and knowledge on a range of issues related to measuring the labour market. In addition, we could count on the critical reading of all chapters by expert reviewers, notably D. Mortelmans (University of Antwerp), D. van Welsum (OECD) and G. Valenduc (FTU Namur). We would like to thank all authors and reviewers for their commitment to the STILE project and to the accomplishment of this book.

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1 Measuring the labour market in the New Economy: the work of the STILE project

MONIQUE RAMIOUL / AN BOLLEN

1.1 Introduction

This book was produced within the scope of the STILE project, with the goal of developing innovative labour market monitoring instruments in a European perspective. The project did not aim to develop new statistical instruments; rather, it aimed to enhance and fine-tune existing statistical tools and instruments in order to improve their international comparative power, to improve the way they capture the *e*Economy and to monitor ICT-related work patterns more effectively.

The improvement of statistics was conceived as a stepping stone towards creating a better underpinning of labour market policies in order to support an improvement in the functioning of national and European labour markets and more precisely adjusted social inclusion policies.

In order to be able to produce useful recommendations for innovating the existing statistical system, adapted to current socio-economic realities, STILE was based on three key pillars that formed the guiding principles for the project throughout its duration:

1. to *innovate indicators and tools* to measure changing aspects of labour markets in the knowledge society;
2. to *gain new insights* into these changes in work and on the labour market;
3. to actively and proactively *involve users and producers* of statistics in a European perspective.

During the life of the project, these three aspects did indeed provide perspectives that were both essential and complementary. This introduction presents some reflections on each of these perspectives: the insights, the indicators and the involvement of users.

1.2 The insights

Improving our understanding of how work is changing in the Information Society and how the restructuring of labour markets takes place at an accelerating speed was the main underlying motivation of the project and the basis for the search for better statistics and indicators. However, the major aim of STILE was to work on indicators that make it possible to gain more insights into the New Economy, rather than to focus on content itself as a primary goal. The globalising economy and labour market, the role of ICT in these, the changes in work and the development of a knowledge-based society may not have been dealt with explicitly during the STILE project. However, the scale and deep impact on work of these processes nevertheless affected the project's work in a number of

ways. Despite its focus on tools and indicators, the project did in fact produce some substantive insights into changes in the labour market related to the New Economy.

The STILE project was to an important extent a successor project of EMERGENCE (Estimation and mapping of employment relocation in the global economy in the new communications environment - also funded as a 5FP IST project). The EMERGENCE project broke new ground in producing knowledge on the globalisation and delocalisation of work and the role information and communication technologies play in these processes. However, in this project it became obvious how inadequate the existing statistical tools and instruments are to map and measure the current dynamics of our globalising economies and labour markets. The added value of the STILE project was that it tackled explicitly some of these measurement problems that were preventing a full and valid insight into current developments. Furthermore, STILE contributed to a critical assessment of the European statistical system and an increased awareness in the international statistics and research community of the current lack of measurement accuracy. In the next section, the most important socio-economic developments that inspired STILE are described to illustrate how recent trends have given rise to questions that demand better statistical measurement tools.

1.2.1 *e*Work

A first and obvious merit of the EMERGENCE project, forming a major point of departure for STILE, was this project's investigation of *e*Work in a coherent and comprehensive way. The EMERGENCE project organised a large establishment survey, covering 18 European countries, and demonstrated empirically that *e*Work is not limited to telehomework but entails a whole range of different forms of collective and individual ICT-supported distant work. Working at a distance with the use of ICT is today a reality for significant numbers of employees and has become a core element in the innovative flexibility strategies of organisations. The individual form of *e*Work, telework, is a cross-cutting new working pattern, accompanying new forms of businesses and linked both to the growth of networking between firms and to new forms of work organisation. Telework affects a broad swathe of workers and can no longer be regarded either as a special privilege for a few managers (who would mostly not regard themselves as teleworkers), or as a form of work limited to the mainly female workforce employed in the grey zone of the economy where homeworking has been a poorly protected working pattern since the beginning of industrial history. On the contrary, it has spread to many disparate groups: for instance, members of virtual teams may now co-operate regardless of where they are actually based; professionals and executives may work in hotel rooms, planes and trains; self-employed people may need to be available 24 hours a day to be available to their customers living in different time zones; truck drivers may be monitored continuously and given new directions or orders whilst on the road; health care providers may supply their services over the phone or the Internet; or software specialists may compete worldwide to solve computer problems via online brokering of their services.

These examples suggest that we are gradually shifting from the mere possibility of being able to work from home to an obligation to be (or at least a demonstration of individual responsibility to be) available for work anytime and anyplace. Broadly defined in this way, *e*Work is impacting on a very large proportion of the workforce, implying new

opportunities, but also entailing new risks. Telework may indeed offer new learning opportunities and more autonomy, but it may also simultaneously increase work pressure, stress and social isolation.

If policymakers and the social partners want to adjust social policies to fit such new realities, they need better and diversified insights into the spread, the shape and the impact of these new forms of work. Existing research does not focus sufficiently on the impact of *e*Work on learning opportunities, working conditions, work-life balance, wage bargaining and the social dialogue more generally. The STILE project understood both the importance of broadening the concept of *e*Work and the necessity to develop innovative approaches to measuring it.

1.2.2 Towards a networked economy

A second underlying assumption of the STILE project is the spread of globalisation and the increasingly widespread use of ICT. The growing globalisation of the economy and the massive penetration of ICT affect the structure of our economies profoundly. These trends have given rise to what is sometimes called the 'network economy'. The economy today is characterised by a blurring of boundaries between organisations, due to a complex cluster of dynamic forms of co-operation of firms with other economic actors. This is related in turn to restructuring at the level of the global value chain. Information and communication technologies underpin this restructuring. The growing permeability of organisational borders is in particular boosted by tendencies of decentralisation, combined strategies of insourcing and outsourcing, the growing share in production processes of service contracts and subcontractors, the virtual separation of economic and legal power within the globalised firm and its local establishments, and the increasing impact of clients and customers on all aspects of corporate governance and production processes. This blurring of company boundaries implies a growing 'triangulation' of power relations. Economic power is concentrated at a global level; responsibilities and management power are no longer clear-cut, especially not for the local management that is confronted with a usurpation of its authority and jurisdiction.

It is obvious that the emergence of the network economy has a huge impact on sectors and firms, businesses and processes, workplaces and occupations, the employed and the unemployed, on local labour markets and on the social dialogue.

In order to provide an initial impetus to political initiatives targeted towards improving the functioning of labour markets in a networked economy, the STILE project focused in particular on the questions of who is measuring these processes of networking and their impact, and by what means.

1.2.3 New production concepts

So far, the outcomes of these developments are not at all clear, especially at the workplace level. What does the blurring of the boundaries of organisations imply for employment polices, for HRM, for strategies on flexibility and for learning policies? Research needs to combine the global and the local because the global market is linked to local and regional labour markets and innovation policies are essential assets in developing work and employment. In addition to insights into the global strategies of firms and the inter-

organisational division of labour, there is a clear need for information on the effects at the level of individual establishments.

The debate on production concepts has been ongoing for several years and has now shifted its focus from production to organisation. Recently the interest in organisational innovation and new production concepts has paid particular attention to organisation-level practices of establishing virtual teams, in parallel with the technical potential of system-oriented technologies to support these kinds of distant work forms. However, the debate is definitely not yet settled on the balance between the benefits for learning, productivity and innovation potential of face-to-face interaction and physical proximity versus the benefits of flexibly composed virtual teams, including professionals from all over the globe. In parallel, the crucial role of knowledge work, of teamwork and of organisational innovation for underpinning regional innovation systems is increasingly recognised in policy documents, research and management discourse.

The critical questions that lay at the basis of the STILE research were how to conceptualise these new work forms and how to define indicators that give a better insight into the scale and characteristics of their spread. Related to this, it was also seen as important to gain insights into the effects on contrasting organisational strategic options, for instance, control versus autonomy, centralisation versus decentralisation, taylorist versus non-taylorist strategies and structures, or social dialogue versus the survival of the fittest. Again, in STILE the primary aim was not to find the answers to these questions but to investigate who is measuring these trends and by what means.

1.2.4 Labour market mobility

In an economy where networks and clusters have growing importance, the concept of labour market mobility is changing. Traditionally, research on labour market mobility has focused on temporary and permanent employment as the most relevant indicators. However new questions have now been raised, such as to what extent the contractual relationship still provides a useful indicator for mobility (or the lack of it) and whether the contractual relationship still reflects the key dimension of the agreement between employers and employees. In a networked economy, where boundaries between companies are blurring, people may work for clusters of firms, for several clients in the same service firm or for the omnipresent customer, rather than for a single boss. How can mobility be defined in such an economic context? The majority of the European workforce still has a permanent contract, especially in the traditional sectors and even in the ICT sector. But this contractual form often disguises the job insecurity that people face as a result of threats of outsourcing and delocalisation, flexible working hours and flexible wage conditions on the one hand, and disguises the actual mobility and labour market behaviour of the high-skilled and professional workforce on the other hand. When there is a shift from lifelong employment in one company towards 'employability', the meaning of mobility has changed. It is no longer a synonym for insecurity, but might become a facilitator of the exchange and spread of knowledge. Employability refers to learning and qualification opportunities, career trajectories, improvement of working conditions through vertical mobility, and income versus wage security. Thinking of the changing economic structure, this concept offers interesting and unexplored opportunities to gain more insights into the

labour market behaviour of different groups, but it is not at all clear how to measure it and what data are available in the existing surveys and administrative databases to do so.

Key questions here are to what extent contractual security is replaced by employability and for whom, and what are the consequences for labour market opportunities, risks and social exclusion. In the STILE project an initial impetus to research on these issues was given by asking the key question: how is labour market mobility measured?

1.2.5 New businesses and new occupations

New businesses emerge as technological applications multiply. Mergers and acquisitions, restructuring at the level of value chains, semi-permanent service contracts and outsourcing give rise to many new kinds of organisations and businesses. Activities that were originally developed as side-businesses or secondary functions in firms become the core business of new firms and establishments. These new businesses adopt a wide variety of organisational structures: freelance consultancies, microbusinesses and SMEs but also large service companies providing shared service centres. In addition, this economic restructuring is a continuous and very dynamic process with an accelerating speed of change. The activities that are actually carried out within individual establishments, especially when this forms part of a larger economic cluster, can change more rapidly than before. It is obvious that this implies huge measurement, classification and analytical problems. This in turn raises questions about the underlying logics and assumptions behind trade and business statistics, and whether these actually reflect the realities of a highly complex economic structure. Furthermore, this economic restructuring impacts on work organisation and on the actual design of workplaces within establishments. Traditional occupations are still a major part of our labour market, but new occupations and task clusters are emerging and evolving rapidly. The blurring of company boundaries goes hand in hand with the blurring of workplace boundaries, task demarcations and the definition of occupations.

This rapid emergence of new occupations and blurring of task demarcations has a considerable impact both on policies aiming at matching jobs and employees within the organisation, and on supply and demand on the labour market in general. These changes also impact on the role of labour market intermediaries. There is a constant need to update the traditional schemes for delineating required qualification and competence profiles that once underpinned labour market policies and guided training programmes. In attempting to match vacancies with job-seekers, labour market intermediaries are confronted with a much wider variety of jobs, firm-specific job titles and requirements. They are forced to redefine their mission and strategies in order to remain relevant actors. In addition to this matching role, the intermediaries also have an important role in outplacement and the reorientation of individual careers. In order to take up these roles, these intermediaries need insights into the nature and formation of occupations. To do so, occupational profiles have to be transformed to suit new requirements and applications.

Another challenge linked with these changes in occupations concerns the appropriateness of current occupational classification schemes. If occupations have changed and new occupations have emerged, this has an impact on the extent to which they reflect the new realities. The STILE research focused both on questions about how to understand new and changing occupations and on questions of classification and coding.

1.3 Statistics

1.3.1 The mission of STILE

Obviously, all these developments pose major challenges to research and statistics. Too many of the observations underpinning policy on the knowledge-based society are still based on hard-to-generalise case study research, limiting conclusions on the extent and the scale of their prevalence, the proportion of the workforce they affect and their potential impact. Others are mere observations or have even not yet gone beyond the status of assumptions. All the trends described above deserve and require systematic and robust empirical tests and it is more than ever necessary that this should be done in an international comparative way, taking into account the diversity of European labour markets, the 'standardisation effects' of globalisation and the rapid speed of change. For these empirical tests, there is a need for data, indicators, tools and instruments, employer and employee surveys, administrative databases, up-to-date classifications of businesses, occupations and of skills, and above all unified procedures and practices in the European and international statistics systems. That is why in the STILE project the trends described above were just the initial starting points for developing research questions. The project itself addressed the problems of measurement rather than attempting actually to carry out the measuring itself; to assess and to innovate research tools rather than to apply them; and to collect, construct and list definitions and survey questions rather than actually using them in its own surveys. By focusing attention on the identification of characteristics and on the innovation and improvement of existing indicators, the outcomes can contribute to more reliable and comparable statistics in research dealing with the same questions.

1.3.2 General challenges for statistics

The reason the project's mission was limited to 'development and innovation of existing indicators' is very simple: it is obvious that the major problem with measuring the Information Society is not a lack of data. On the contrary, policymakers, researchers and, not least, citizens have increasingly to deal with a profusion of statistics, an overwhelming mass of data and information. Today, more than ever, policymakers want researchers and statisticians to select for them the data which will serve them best. They want that 'one right figure' yesterday, so that they can make an informed decision today. But citizens too are confronted with the problem of over-information, making them feel insecure, uninformed or ignorant about what is happening in society in general or even in their own neighbourhood. The citizen as well as the policymaker runs the risk of becoming in a sense 'statistically incompetent'.

The problem of over-information sheds a new light on the classical UN declaration on the fundamental principles of official statistics. This declaration states that statistics are the cornerstone, the indispensable element in the information system of a democratic society, serving the government, the economy and the public with data on the economic, demographic, social and environmental situation. In the context of a risk of over-information, 'serving the government, the economy and the public' has acquired a different meaning, implying in the first place the need for more systematic guidance on the

selection and use of these data. How else can the challenge be met of providing the citizens of democratic societies with relevant information about the societies in which they live? How else can information today genuinely underpin democratic decision making processes and policymaking?

In general, there is a need to reflect about - and maybe redefine - the meaning of the digital divide. What societies face today is an information divide of the second degree. Lack of technical or even financial access to the Internet in Western societies seems no longer to constitute the main source of *e*Exclusion. What is at stake is the ability to find the right information offered on the bottomless world wide web, to identify the providers of this information, to have the means to assess the data critically with regard to their reliability and validity and finally to select from them that what is really useful or helpful. So, alongside issues of availability and access lie additional issues of assessment and selection. These increasingly complex issues demand new competences from researchers, policymakers and citizens. It is clear that there is a risk that these new competences are unlikely to be available to the lower skilled, older people, the less qualified or the poor. Of course, to overcome this 'information divide of the second degree' is an ambitious goal far beyond the capacities of a small research project like STILE. It is however a fundamental task and challenge for statistical and scientific policies and for democracies in general, requiring a combined strategy at the international, European and national levels.

For the development of the statistical system, however, this problem of over-information and too much data means that effectiveness and efficiency have become the core criteria for assessing the benefits of statistical innovations. 'Meta-data' is a buzz word among contemporary statisticians, whilst mapping, ordering and structuring existing data and turning them into ready-to-use information has become the core business of a booming industry, not only in research institutes, but also in private consultancies, and also - not to be forgotten - in the lobbying industry. In such a context the first question that needs to be asked is whether it is relevant to propose a new survey, new statistical overviews or new readers at all. To address this, in STILE, efficiency and effectiveness were always major criteria. The future development of the international statistics system calls for synergies and collaborations between private and public agencies and between official statistics and research. STILE therefore aimed at effective and efficient tools, meta-databases and SWOT analyses, action plans for convergence, recommendations for the review of existing schemes and practices and including as a core dimension the collaboration between academics and statistical institutes.

The implications of this approach were that STILE needed to cover a broad range of measurement issues, rather than focusing its activities on a single problem during the project's lifetime. Nevertheless, the project can be subdivided into two major parts. In the first, STILE mainly addressed issues related to the impact of ICT on the organisation of work and new working patterns. This part mainly dealt with *e*Work, the emergence of a networked economy and new production concepts. In the second part, the major theme can be defined as the investigation of the extent that the mapping of the Information Society is possible with existing statistical tools - more specifically, the use of existing labour market data, classification schemes and occupational profiling methods. In this part the focus was mainly on the consequences for existing statistical tools of changes in labour market mobility and the emergence of new businesses and occupations.

Later chapters of this book illustrate the typical approach of the STILE project in relation to these key themes.

1.4 Involving target audiences, users and producers of statistics

1.4.1 Collaboration with producers of statistics

A last major pillar of the STILE project was the active and proactive involvement of statistical audiences in the project's work. Alongside the insights and the statistics, the strategy of involving the users and producers of statistics was a crucial dimension of the STILE project. From the very beginning, the project plan involved a range of different target audiences at national and European levels. This user involvement was needed to ensure the relevance and effectiveness of the work, which were key criteria. This principle of involvement of stakeholders, especially statistical institutes, not only made a major contribution to the development of the project's work and its effectiveness but also formed a useful dissemination method at the same time. For instance, it helped to raise awareness of the importance of a more systematic and objective measurement of telework and the impact of ICT on work and organisation. It also convinced national researchers of the importance of bringing in a European perspective aiming at more international convergence and continuity of establishment panels. That is why STILE collaborated from the start with the national statistics institutes (NSIs) and with other relevant producers of statistics. The experience has shown that it is not self-evident, but very rewarding to bring together what seem to be two separate worlds: that of independent and university-based researchers on the one hand and that of statisticians and public statistical institutes on the other. Although sometimes challenging, we feel that the synergistic effect of bringing together the theoretical reflections of academics with the practical minds of statistical practitioners has been amply demonstrated within the STILE project. A main conclusion is that a systematic and structural co-operation between academics and statisticians is needed more than ever in this period of rapid change. In this respect, in particular, Eurostat has a crucial role to play in stimulating user groups in all Member States and at the European level. A more structured and systematic collaboration and exchange is clearly required when it comes to the innovation of existing statistics and the creation of new tools and instruments to take account of current changes in the economy and society.

1.4.2 The users: more creativity needed

In general, the involvement of users, next to the producers of statistics, is even less developed in our statistical systems and in our research practices. It is nevertheless equally crucial, not least to limit the risk of 'statistical incompetence' referred to above. This seems to pose a particularly difficult challenge to researchers as well as to public administrations and statistical institutes. So far, it seems that solutions have not yet been found to ensure appropriate communication channels and mechanisms to include users in statistical work, whether these are policymakers, 'the citizen' or the firms that are involved in research as survey respondents as well as research users. It seems likely, however that greater involvement would improve effectiveness and efficiency. For instance it is likely that response rates, in particular of firms, would be higher if respondents were aware of the importance of statistics for economic and labour market policies and would be more motivated to participate if they had a better understanding of what lies behind the figures and how policies rely on them. The same goes for policymakers as users. The dialogue

between policymakers and scientists is fairly intermittent in many countries and is often characterised by mutual distrust. A more systematic user involvement is undoubtedly an important challenge for the future. As a starting point this will require more structural collaboration and dialogue between academia and public statistical bodies.

1.4.3 The limits of research for the innovation of statistics

In STILE's search for the main initiators of establishment surveys, with a view to developing a convergence strategy in the design of these surveys, it became apparent that there is a very dispersed academic community at the European level. By contrast in addressing the Community Labour Force Survey (in the context of the coding exercises, a comparative analysis and the development of an ad hoc module on telework), the European statistical system appeared as an 'over'-organised system, tightly organised through rigid and time-consuming procedures. These were the two extremes that the STILE project discovered. Each in its own way challenged the consortium on its ideas of how to involve target audiences and urged the team to look for creative solutions to improve the project's impact. This included the organisation of workshops, of stakeholder investigations, of user group meetings, of dissemination events and of clustering activities with other relevant European projects. Despite this, an effective uptake of the project's results is not at all obvious in the short term.

The problems of measurement and innovation of statistics and indicators at the European and even the national level are in general hampered by the slow processes of change. Political, bureaucratic and institutional factors all create impediments to innovation. This is the price that must be paid for continuity, unification and standardisation. This problem is of course not specific to the STILE project. Another worrying trend can however be observed (not only in the case of STILE): that the innovation and improvement of statistics is increasingly expected to rely on project funding. The question whether this is due to a lack of comprehensive statistical policies presents itself. If ideas of statistical innovation, however modest they may be, must be initiated by or elaborated in the frame of fixed-term research projects, the innovation process itself is at stake. Research projects are funded in the frame of cyclical scientific programmes, which means that they have a short lifetime. If statistical innovation has to rely in the first instance on project funding, it relies on the unsteadiness, even the whimsicalities, of RTD policies, on the uncertainty and - not least - on both the political and the budgetary business cycles. This is not only the cast at the European level, but may also be the case at the national level.

1.5 Conclusion

The STILE project made three main contributions to a better statistical monitoring of the labour market. First, starting from broadened insights into socio-economic trends and their relevance for citizens, the workforce, firms, policymakers, researchers and statistical institutes, it contributed to a general increase in awareness of the challenges posed by the New Economy to the statistical community. The project started from insights into changing inter- and intra-organisational divisions of labour (networking and outsourcing), organisational changes (production concepts), changes at the workplace (*e*Work), changes in labour market behaviours (mobility) and workforce composition

(new businesses and occupations). These trends are interrelated. If social policy wants to adjust in the most appropriate way to these trends, it is important to gain better insights. Without appropriate indicators and statistics, it is not fully clear to what extent these trends are emerging in society.

A second group of questions addressed the impact of these trends. These developments may impact on several domains at a variety of levels. Economic growth may be influenced. Power relationships between the supranational, the national and the local level may change. Social policies may be questioned. Labour market intermediaries such as training institutions may have to reorient their objectives and methods. The inter- and intra-organisational division of work may alter. There may also be consequences for working conditions, learning opportunities, stress at work and a variety of other aspects of life coinciding with the transformations described above. As already noted, however, the STILE project did not address itself to investigating these consequences. The focus was primarily on how to measure these socio-economic trends. This was the second contribution of the project. The outcomes of STILE include a critical assessment of several aspects of the statistical system and the resulting insights have at least given an initial impetus to the production of more reliable and comparable statistics. In this respect the project team aimed to improve existing statistics and indicators, most of which are already designed in such a way that they can in principle allow for international comparative research. In this way the project contributed to the more general democratic goal, embodied in the UN declaration, of contributing to the improvement of public information and acknowledging the inhibiting effect of over-information.

The third contribution of the project can be situated in a critical reflection on the dynamics underlying the realisation and innovation of statistics. The project team's experience with user involvement has offered insights into the forces facilitating and inhibiting an adequate statistical system. It has been demonstrated that the collaboration between academics, statisticians, policymakers, organisations and other users of statistics can contribute to more useful, comprehensive and reliable statistics. Especially when statistics need to be innovated, it is important to stimulate such a broad co-ordination. In its work on the innovation of existing statistics the STILE consortium also found that it is difficult to realise such ambitious goals within the confines of an external project-based approach. It is apparent that statistical innovation is only possible if it is supported by a comprehensive and coherent statistical policy based, and legitimated, from within the existing statistical institutes, but with close collaboration from other stakeholders in the policy domain, in industry, in labour, in academia and in civil society.

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2 European establishment surveys: obstacles and opportunities on the road to cross-national convergence

PETER ESTER / MARKUS PROMBERGER / AMELIA ROMÁN

Abstract

Labour market and ICT research in Europe still lacks adequate data from establishments, which are the crucial units of the labour market. Although there has been a remarkable development of national establishment surveys in some countries, there is little comparability between them and very few comparison activities have been carried out. The STILE research on organisation surveys, of which this contribution is an extract, gives an overview as well as some reasons for this, showing a path to close the 'meso gap' of European labour market statistics by enhancing and encouraging co-operation activities between different establishment surveys - a kind of 'bottom-up' convergence. Reasons are given why this might prove to be appropriate to the present-day socio-political conditions of knowledge and data production in Europe.

2.1 Benchmarking organisational surveys

Establishment or organisational surveys, especially those with a panel character and covering the major parts of an economy, are a relatively new instrument in monitoring labour markets - not only in Europe but also worldwide. The US-American Annual Survey of Manufacturers is one ancestor dating back to the early 1970s, which, although conceptualised as a cross-sectional survey, may also be analysed longitudinally. Another pioneer is the British Workplace Employee Relations Survey (WERS) dating back to the early 1980s and still existing with some changes in its name. In the following two decades scientists in many European countries developed establishment surveys of one kind or another - a procedure which was recently catalysed by the Eurostat enterprise panel workshop in 1994 (Ojo, 1994) and subsequent activities such as the CAED (comparative analysis of enterprise data) conferences (e.g. Laaksonen, 1997; Biffignandi, 1999). But what is still missing from the existing establishment panel surveys, especially during the present period of rapidly proceeding European integration, is cross-national comparability and comparison activities, going beyond the perspectives of single national labour markets. Under the impact of ICTs with their rapid restructuring of labour markets, establishment-based labour market monitoring in a cross-national perspective is increasingly becoming a severe challenge, despite the need to focus on establishments as those units of economy and society where the demand for labour is rising, being structured and being fulfilled. Cross-sectional establishment surveys throughout Europe, like the

European Foundation survey on 'Working time and work-life balance'[1] or the Continuing Vocational Training Survey - CVTS,[2] only partially fill the needs of labour market monitoring, giving good impressions of what is existing and - if repeated - on changes at the aggregate level, but without making it possible to depict and follow establishments' behaviour through changing conditions over time. Such a demand can only be filled by instruments offering possibilities for longitudinal analysis - like panel surveys. This is where STILE becomes relevant. Conceptualised as a feasibility study on organisational panel surveys, it started with a benchmarking inventory of existing establishment surveys, comparing the methodology and content of about thirty surveys, especially taking into account their coverage of ICT and labour market aspects, publishing the results electronically on the STILE website[3] and thus making a large set of current establishment surveys transparent for researchers from everywhere, based on the conviction that depicting the differences is the first step towards comparison and convergence.

A wide range of diversity in methodology, coverage and content was found, although only an exceptional small group of existing surveys appear to have more in common than the fact that they are questioning organisations. As a next step, a publicly accessible ICT-related questionnaire module has been designed to stimulate some convergence of research procedures at that point. But bringing European establishment panel surveys together is not only a matter of describing and comparing methods and contents but also of setting in motion procedures for enhancing institutional co-operation - as will now be demonstrated.

2.2 The long road to closing the 'meso gap'

More than ever, data collection and research of this kind are subject to political interests and practical needs of the actors on the labour market, which therefore also formed part of our comparative study. The results of an investigation of stakeholders' needs showed that there is in fact considerable practical necessity for developing an establishment-based monitoring system, not only to measure the impact of information and communication technologies on the labour market, but even in a more general sense, to monitor problems concerning ICT over future years. Several types of problem may manifest themselves. One of these might be a lack of skilled labour existing in spite of generally high unemployment rates, as is the case in Germany. Another may be the different use of non-standard employment across different European nations, or labour migration, which can be expected to increase in the future, partially due to the enlargement of the European Community. Each of these various labour market problems has aspects which strongly affect or are affected by the labour force structure, supply and demand in establishments and other organisations, which clearly makes closing the 'meso gap' an issue for the longer-term agenda. As we showed in the benchmarking inventory of organisation surveys, various countries have developed establishment-based monitoring systems in the past two

1 This survey is presently fielded by the European Foundation on the Improvement of Living and Working Conditions in Dublin.

2 This survey was conducted in 1995 and 2001 by the European Commission, a follow-up survey is planned for 2006.

3 http:\\www.stile.be.

decades, ranging from single or repeated cross-sectional surveys over panel surveys to linked datasets, combining establishment information with employee data. But the progress towards a European establishment survey, or at least cross-national comparability, is not proceeding as quickly as the European unification process itself. It is for this reason that we felt it was necessary to investigate the reasons for this as well as how the situation could be improved.

2.3 Contradictions, similarities, obstacles and opportunities

Among trade unions and employers' organisations, there is a traditional distrust of establishment surveys. Some union activists feel that establishment data are unreliable because they are based on the results of questions posed to management rather than to the employees. And managers, according to the unions, are likely to respond in ways that primarily reflect their economic and political interests rather than objective facts. Bearing this in mind, a number of union members and social researchers met this challenge by developing surveys in which workforce representatives were questioned. There is some experience with this option in Germany, especially in relation to the shop-floor regulation of working hours, following sector level collective agreements (Promberger, 1994; Herrmann, Promberger, Singer & Trinczek, 1999) and flexible scheduling in general (Seifert, 2001; Promberger, Böhm, Heyder, Pamer & Strauß, 2002). Research showed that when compared to management questioning on the same topics, most of the contradictions observed were a result of different sample structures due to size and sector (Bellmann & Ludewig, 2000). These results are reassuring: if it can be demonstrated that there is no bias between management and employees, then arguments can be put forward to overcome this distrust.

Employers' organisations also manifest a specific distrust concerning surveys of firms. This is related to the attitude of many entrepreneurs not wishing to allow anyone to look too closely into their business. This attitude can still be found in privately owned organisations of any size, but particularly in small and medium-sized firms all over Europe. *Le patron, il patrone, der Herr im Haus* or similar expressions in other European languages represent a still existing feature of business life, associated with a distrust of unions, regulatory authorities, the media or any other kind of uncontrollable outside publicity - including opinion polls. But the situation may change, if the needs and opinions of the employers are themselves part of the survey, in a descriptive and neutral way, and if the employers' organisations recommend participation in the survey. Employers and their organisations may then view this as an opportunity to voice their needs and interests to the public.

Beyond specific distrusts, unions and employers' organisations also have different perspectives on establishment survey content. The employers generally want a focus on the identification of business obstacles and on measuring the influence of business conditions such as management strategies and collective agreements on output and performance. The labour unions stress issues that will provide the kind of information that will enable them to improve the conditions and quality of work and the employees' economic situation, and alleviate unemployment and adaptation to economic changes. This leads to slightly different requirements concerning the data collected: unions tend to demand more data on working conditions in the establishment, and employers' organisations tend

to place more emphasis on business conditions. But the similarities seem to be more numerous than the discrepancies. To a certain extent both sides need similar basic data on sector, size, performance, organisational change, ICT use, labour force supply, demand and turnover, wages and working hours. Based on these common interest data, their different perspectives become relevant at the stage of analysis, and not so much in the design of the survey and the data collection phase.

There is a certain lack of information among some actors concerning establishment surveys. Because this data collection method is much younger than individual or household surveys and only recently left the laboratories of economics and social science, it is not commonly known what purpose it serves. The dissemination of knowledge concerning the establishment-level survey approach has, up to now, followed three specific paths. The first path is that of modern labour economics or econometrics at the universities which have educated a part of the younger generation of stakeholders' economic experts. The second path follows the 'sociology of work, industry and organisation', which tries to overcome the limitations of case study research, followed by those stakeholders' experts who have strong personal connections to this research discipline either through education or profession. The third path is taken by the 'senior experts' within the stakeholders' organisations, who simply know from experience about the lack of evidence concerning cross-national establishment research and search for approaches to alleviate this. Working concurrently with these three paths there are the more traditional methods used by economists of the old (model building) schools, sociologists who are familiar with case study research and databases derived from individual or household surveys, and a wide range of policymaking experts, who are in fact professionals in using scientific results but work separately from scientific fieldwork and paperwork. That there is a certain lack of statistical information is very well-known, but that meso-level surveys provide a method to eliminate this problem is not widely known. Once informed about these methods, many stakeholders' organisations quickly recognise their potential and enhance the spread of this knowledge within their organisations by inviting researchers to participate in various activities. Among the actors questioned in stakeholder organisations there is a strong correlation between an increasing distance from scientific work and the need to have a method to 'piggyback' on a theme of interest. In other words, if we take the actors not following the three paths into account, methods and instruments can more easily be 'sold' by themes than on their own. The goal of a convergence on European establishment data can, at least in the near future, only be aimed at, if it remains a kind of 'side effect' - for example by providing better possibilities to measure the impact of ICT on establishments' labour demand.

A generally very helpful condition for raising awareness and support for establishment-based labour market monitoring is the fact that scientists and academics play an important role as experts in stakeholders' organisations. We also find scientists and science-oriented academics in the trade unions, at least in the second row, standing directly behind the 'labour leaders'. This might be judged as a result of an intra-organisational selection of proper interview partners, but when we looked at the status of these individuals, we found that most of them were not just scientific assistants but rather persons belonging to the centre of power within their organisations. This seems to be a result of how the knowledge society has changed skill structures and power resources in political organisations. Having a 'say' in matters has a great deal to do with a combination of business knowledge and excellent networks.

Turning away from the actors we studied, we still can identify some major obstacles, which result from the specific structure of cross-national policymaking in Europe. There seems to be one reason in particular why the European supranational labour market organisations and authorities could not force the process of closing the gap more quickly, and this consists of two interconnected problems. The first of these is the necessity of EU administrative action which comes close to legislation, for - at least partially - implementing a statistical labour market monitoring system. This should not pose any real problems, as it has already been achieved by many European or other OECD countries. However, in certain cases even this may turn out to be a sizeable hindrance (as was the case in the debate concerning the German census in 1984). If we leave the national level, the situation becomes quite complicated because of the second reason. This is the well-known heterogeneity of interests, which is stabilised or even enforced by the specific federal structure of the European Community. In addition to the interest groups on the labour market - unions, employers' organisations and the government - we have the European nations, each of which has its own specific interests, standing alone or forming strategic alliances with others. This competition of nations not only affects the EU authorities, but the large interest groups on the labour market as well, where, to complicate matters even more, the leadership changes frequently from one national state to another. Generally speaking, nation states in Europe are much stronger and quicker decision makers than the EU government.

The very nature of this structure inhibits and impedes the process of (rapid) change. One might argue that other parts of the world have the same problem: for example the US which also has a federal structure. However, the US has had some two hundred years to negotiate the centrality-decentrality problem of government whereas the EU is only just beginning the negotiations. Also, the US has for more than a century now established its identity much more in terms of a nation state whereas the EU primarily identifies with the status of a federation of nation states.

2.4 Official top-down implementation or bottom-up convergence: two approaches and their chances for success

One way to get closer to a European establishment monitoring system would surely be to initiate efforts towards creating the basis for an official establishment census/survey system beyond the few existing cross-national establishment surveys of limited scope, similar to the existing household or Labour Force Surveys but with more emphasis on options for longitudinal analysis. However, this is a procedure that leans towards legislative action. In such a case, based on legal prescriptions, Eurostat could develop a kind of establishment census or survey, similar to those in Canada and the US,[4] allowing for the

4 Statistics Canada succeeded in merging the incredible amount of more than 200 sector-wide establishment surveys into a unified establishment survey. The United States Bureau of the Census recently managed to build a longitudinal database from various establishment surveys, of which the Annual Survey of Manufacturers and the five-years Census of Manufacturers are the oldest, existing since about 1972, though limited to the manufacturing industry. Even the People's Republic of China is presently busy with its first agricultural census, counting not people but units of production, and a first establishment census is intended to follow, replacing the old sector report system.

linkage of yearly data to a longitudinal dataset, and possibly even allowing for a connection to employee surveys. But, as previously stated, legislative or any other official action is considered to be a long and tedious route. Another possibility would be a convergence of existing establishment surveys at national levels, similar to the aims of the STILE project, by a comparison of methods and contents, by sharing solutions to special questions, by exposing the results to scientific debate, and by intensifying the relations between scientists and stakeholders. This method of working is similar to that of an ant where many very small steps lead to convergence, in this case, of establishment monitoring from the bottom up. It seems that nearly everything which had been done in respect of this so far, and any success which has been reached until now, is in fact a result of this 'convergence from the bottom up' strategy. And, if we take Weick's (1969) model for organisational change into account, following existing paths to a certain aim is easier and more rational than building completely new ones.

Nevertheless, this strategy faces its own difficulties. Firstly, by bringing together various existing establishment surveys from all over Europe, one is confronted with many different concepts, definitions, sampling procedures, methods, and research questions. Making these differences visible and therefore operable for comparison was the first aim of STILE. This of course, was just a first step towards finding a solution to the problem of integration. Offering a public-use survey module is in fact preparing for a second step, which could be taken if the module is implemented by other researchers in organisation surveys.

Secondly, as long as there is no 'official' European establishment survey, all establishment research efforts are periodically threatened by the danger of extinction if they do not manage to change and adapt to new themes and topics in keeping with the rhythm of funding cycles and research programmes. This is not so much a problem for research trying to find mid-range answers to present-day questions. But there is a persistent or only slowly changing common structure underlying the European economy and labour market, consisting of socio-economic change from agriculture or manufacturing to services, which also means a change in skills and work culture, demographic changes, technical progress leading to changes in labour structure and demand, and social integration. These underlying structural changes have given birth to past, current and future labour market problems - be they unemployment, ICT or the ageing labour force. We have the opportunity to obtain a wider research perspective and better explanations for our present-day problems if we accept that these underlying persistent questions require persistent research with longitudinal options, including current themes but not exclusively focusing on them. In the case of labour force or household research at the EU level, consistent research activities have been established during recent years. But in the case of establishment research, a solution for the problem of continuity is still far away, its shape quite unclear, and the question remains, how and to what extent the strategy of 'convergence from the bottom up' can contribute to solving it.

At the conclusion of the STILE research on organisation surveys, it seems worthwhile to consider just what such a solution to the problems of integration and continuity of establishment research might look like. Reaching a state of greater continuity is first and foremost a problem of adequate funding. As empirical examples show, there are two ways to solve this. The first is to establish an official European establishment panel survey by action of the EU authorities. This solution however, appears to be one for the more distant rather than the near future. If official implementation at the highest level is not

currently possible, and we are acting presently at the lower levels of national establishment surveys and at the very beginning of cross-national integration, we should probably look for an intermediate level of action.

Maybe a possible solution would be to bring all or many interest groups together for funding a kind of 'non-official' establishment panel survey. This method of co-operation has been taken by at least two big national panel surveys (Germany and the Netherlands), each existing for more than ten years now. Possible partners would not only be researchers and research institutes, but also labour market organisations, research foundations and government authorities. One might argue that by doing this at the EU level, a conflict of interests could develop which might never be resolved adequately. There may of course be some validity in this argument, but two things should be considered. The first is what might be termed the 'crowded house' effect, which simply states that the more people are inside the shop, the more want to get in. In this manner, if a group of important key partners in science and among the stakeholders could be mobilised, the others would follow simply through their own interest. Second, the diversity of interests could be channelled by a consistent pre-structuring of the discussion, done by experts. Negotiations could also be simplified by a set of measures such as a de-coupling of problem-solving and bargaining procedures. Scientists are bound to play a key role in these proceedings as interpreters, problem solvers and access people, because their internal diversity of interests seems to be the lowest of all the possible groups involved, and scientific networks are obviously not limited to scientific institutions but have the potential to be enlarged more and more to include stakeholders' organisations, changing their character from a purely scientific network to a science, knowledge and application network.

Before proceeding to this stage, we should first examine the other problem of a convergence of cross-national establishment surveys, the issue we called the 'integration problem'. There is some evident intercorrelation between the continuity problem and the integration problem, because ensuring continuity is only possible by raising the degree of integration; otherwise it would not make sense, because anyone involved in the continuation would want to see progress in bringing all the pieces closer together as a kind of 'return on investment'. But the present day patchwork of organisation surveys in Europe is a strong precondition which makes it quite impossible to establish a whole new survey alongside the existing ones, which - in the worst but very likely case – would involve questioning the same (larger) establishments a second time. This creates the necessity to integrate the existing national establishment surveys more comprehensively, which is a procedure that might create conflict with national stakeholders' interests. There are two ways around this problem, both of which should be followed. The first is to invite important national stakeholders to participate in a European establishment panel support group. The second is to enhance standardisation efforts on the existing establishment panel surveys. One good step is to support the existing efforts by suggesting themes of current common interest to be implemented as questionnaire modules for those portions of labour market-oriented establishment surveys which are permanently used for providing basic information. We can presuppose wide overlaps and suspect relatively easy negotiations, due to the large extent of 'non-intended' analogies which already exist - and are already successfully made use of, as Allaart & Bellmann show in another chapter of this reader.

We hope, that the activities and outcomes of the STILE project will not only demonstrate the state of cross-national establishment research on ICT and the labour market but

also shed some new light on the potentials and possible paths towards the future development of European establishment-level research, which can help not only to close the 'meso gap' of European labour market statistics, but also to provide substantial information needed by European policymakers to enable them to address the challenges of socio-economic change at the beginning of the 21st century.

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3 Employers' demand for part-time workers: incidence and motives in Germany and the Netherlands

PIET ALLAART / LUTZ BELLMANN

Abstract

In the European Union part-time employment is regarded as an instrument to increase the employment rate. Although it has increased in many countries, especially among women, the proportion of part-time employment varies considerably among countries. Research on part-time work has in most cases a limited scope, because only the supply side of the labour market is considered. Less work is done on the demand side of the labour market. In this paper we concentrate on the demand side of the labour market, and analyse differences between Germany and the Netherlands from the employer's prospective.

3.1 Introduction

In many industrialised countries part-time work is increasingly important, especially among women (Buddelmeyer, Mourre & Ward, 2004). However, the percentage of total employment varies considerably between countries. Since the incidence of part-time employment is the result of workers' preferences on the one hand and employers' demand on the other hand, explaining these differences is complex. A further complication is that different government policies, in the form of labour laws, social security and tax rules, give positive or negative stimuli to part-time work. In the European Union part-time work is often seen as an instrument to increase the employment rate (Bielenski, Bosch & Wagner, 2002). Last, but not least, the cultural aspect (social acceptance of part-time work) cannot be neglected. Therefore, a full explanation of differences between countries in the incidence of part-time work needs a comprehensive analysis.

Research on part-time work has in most cases a limited scope. A large number of studies have been carried out from the perspective of the supply side of the labour market, and use individual or household data. This has been stimulated by the increasing participation of women with children on the labour market and questions about how to combine family and work. Accordingly, the gender dimension in part-time employment is the focus of much of the literature (e.g. Blossfeld & Hakim, 1997; Mc Rae, 1995; OECD, 2002; Rosenfeld & Birklund, 1995; Rubery, Smith & Fagan, 1998; Tijdens, 2002). Less work is done on the demand side of the labour market. In this paper we concentrate on the demand side of the labour market, and analyse differences between Germany and the Netherlands from the employer's perspective.

In 2000 the incidence of part-time work was 17.6 percent in Germany and 32.1 percent in the Netherlands (OECD, 2002). The purpose of this paper is to investigate to what extent this difference can be explained from the demand side of the labour market. This

means that we concentrate on part-time jobs, which can differ from part-time workers because workers may combine two or more part-time jobs with different employers.

Our data are from the IAB and OSA establishment panels for Germany and the Netherlands, respectively.

3.2 Employers' motives for introducing part-time jobs

Why should an employer introduce part-time jobs? In the literature three main categories of motives are distinguished (Tijdens, 2002). The first of these is the need for cheap, and sometimes flexible, labour, also called the 'secondary workers strategy'. This literature concentrates on the US,[1] because in that country part-time workers have a less protected and less privileged position, e.g. in terms of social security, pension and health insurance (Ehrenberg & Smith, 1997). Drobnic and Wittig (1997) conclude that there are 'good' part-time jobs in the US, but that these are more the exception than the rule. This confirms the findings of Tilly (1991) that in the US the expansion of part-time employment was concentrated in 'bad', secondary part-time jobs. In European countries too the secondary workers strategy can play a role in the demand for part-time workers. An example is the part-time work of students and, in some countries, of pensioners.

The second motive is optimal staffing. Optimal staffing aspects can be important in establishments where services are concentrated into a few hours per day, where the workload varies in other forms, e.g. by the day (e.g. care for elderly or handicapped) or by the week (e.g. shopping days), or where the operating hours are extended (as in some services).

Calculations from the European LFS show that, on average, one-third of all part-time workers work evenings, nights, weekends or shifts on a regular basis (OECD, 1998). The basic idea behind the optimal staffing motive is to prevent paying full-time workers for idle hours. Optimal staffing is related to flexibility. However, there is a difference between part-time workers who work a certain number of fixed hours per week and those with irregular hours - irregular in the sense that the number of hours worked varies with the rate of activity or is related to unforeseen replacement of absent workers. In most cases the average number of hours worked in these irregular jobs is small; in Germany workers in these jobs are called *geringfügig Beschäftigte*.[2]

The third motive for introducing part-time jobs is to meet the preference of workers, also called the 'accommodation strategy'. The labour market situation will influence the willingness of employers to meet workers' preferences. In tight labour markets it will be easier for workers to realise their preferred working hours than in a situation of high unemployment. This could lead to more or fewer part-time jobs depending on the workers' preferences. Literature on this point includes, among others, McRae (1995), Meulders, Plasmans and Plasmans (1994), and Rosenfeld and Birklund (1995).

The first two motives are related to management needs, whereas the last motive originates from the supply side. A survey in eight European countries (Bielenski, 1993) in 1990

1 An example of extension to the Anglo-American world is Warme, Lundy and Lundy (1992).

2 The most important criteria for this group is that they earn on average less than 325 euro per month and work less than 15 hours per week. They are not included in the social insurance regime for workers (see Troost & Wagner, 2002 for details).

showed that 41 percent of the part-time jobs introduced could be attributed to management needs, 36 percent to meet workers' preferences, and 22 percent were based on a consensus between both parties (Delsen, 1995). The smaller the establishment, the more frequently part-time work was introduced for economic or organisational reasons. Germany was one of the countries (with Ireland, Spain and the UK) where management needs (43 percent) were more important than workers' preferences (29 percent). The Netherlands joined the group of countries (with Belgium, Denmark and Italy) where workers' preferences were relatively more important. Other research confirms that in the Netherlands the accommodation motive is dominant (Delsen, 1995). The study of Delsen also makes it clear that jobs with a small number of hours are more related to management needs, and part-time jobs with more than twenty hours are more likely to be introduced in response to the wishes of employees (see also OECD, 1998).

In this paper we use data that can be related to the different motives, although a strict distinction is not always possible. However, an impression can be given of their relative importance in Germany and the Netherlands.

3.3 Official statistics on part-time work and data from the IAB and OSA panel

The German and Dutch figures for part-time employment that we presented in the introduction are based on the European Union's Labour Force Survey (LFS). This is a survey of individual inhabitants. The distinction between part-time and full-time is based on the respondent's perception of their main job.[3] In Germany no further adjustments are made, but several other countries combine this information with a threshold for full-time work. The Netherlands uses a cut-off of 35 usual hours per week to reclassify jobs as full-time or part-time[4] (Van Bastelaer, Lemaître & Marianna, 1997). So, even in the OECD statistics, Germany and the Netherlands are not fully comparable. The OECD figures for 1999 were 17.1 percent for Germany[5] and 30.4 percent for the Netherlands.

The IAB and OSA panel surveys are based on information from employers, and they observe part-time *jobs* (as opposed to *workers*). It is possible that a worker might have another part-time job with a different employer. For this reason we might expect slightly higher percentages of part-time employment than in the LFS. However, there are also other differences. In the IAB panel there is a first question whether there are part-time workers or not. If the answer is positive the next question asks for the number of part-time workers, classified into three categories: fewer than 15 hours, 15-25 hours, and more than 24 hours per week.[6] Note that the employer's definition of part-time work may differ from that of the worker (reported in the LFS).

In the OSA panel there is no question about part-time work (yes or no), but workers can be classified by the hours worked per week: less than 12, 12-23, 24-34 and 35 or more.

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3 Note that also in this case an individual can have more than one part-time job.

4 In the majority of Dutch establishments the standard full-time workweek is 36 or 38 hours (Tijdens, 2003).

5 In 2000 a revision took place of the German labour market statistics, with the result that more jobs with a few number of hours were included. This raised the proportion of part-time jobs with five percent points (Troost & Wagner, 2002).

6 There is also a fourth category of no fixed hours.

Jobs with fewer than 35 hours per week are regarded as part-time jobs. This corresponds to some extent with the 35-hour threshold in the Dutch LFS. Of course it is possible that some full-time jobs may have fewer than 35 hours and that some part-time jobs may have more than 34 hours.

Our conclusion is that figures from the LFS as well as from the IAB and OSA panels are not fully comparable, but in practice the differences in definitions are relatively small. Table 3.1 presents the figures for 1999, the year of our analysis.

Table 3.1 Part-time employment in Germany and the Netherlands from different sources, 1999

Germany		Netherlands	
EU LFS	IAB panel	EU LFS	OSA panel
17.1	Former West: 19.5 Former East: 16.3	30.4	31.7

For Germany, the analysis will be confined to former West Germany, because a first analysis pointed out that part-time work has totally different origins and characteristics in former East Germany.[7] Both panels show figures that are in agreement with the LFS figures. Table 3.2 and Table 3.3 present the IAB and OSA figures for different classes of hours worked, differentiated by size classes and sectors of economic activity. The classes of hours are comparable with the three types of part-time jobs distinguished by Hakim (1997). In her typology, weekly hours a little shorter than usual (30 or more) are described as 'reduced hours work', those with 15-29 hours as 'half-time jobs', and those with less than 15 hours as 'marginal jobs'. Reduced hours work is mostly the preference of the worker, and marginal work mostly results from the need of the employer for cheap labour.

What we see in Table 3.2 and Table 3.3 is that in both countries part-time work is concentrated in jobs of fewer than 25 hours (in the Netherlands fewer than 24 hours) per week. However, this is much more pronounced in Germany (78 percent of all part-time jobs) than in the Netherlands (62 percent). The larger share of 'reduced hours work' in the Netherlands suggests that meeting workers' preferences is a more common motive there than in Germany.

With respect to size, there is a marked difference between the two countries. In Germany the smallest establishments (fewer than 20 workers) have the highest share of part-time jobs. In the Netherlands most part-time jobs are found in the largest establishments (more than 500 workers). This can be explained by the fact that in Germany most large establishments are found in manufacturing, whereas in the Netherlands they are in health care and other public services.

The sector figures reflect differences between goods-producing sectors and services, which partly coincides with male-dominated and female-dominated sectors. For the goods-producing sectors the differences between the two countries are relatively small. For private services and the government sector the relative number of part-time jobs is not

7 See Drobnic (1997) for the role of part-time work in former planned economies.

very different between the countries, but the average number of hours worked is higher in the Netherlands.

Table 3.2 Share of part-time workers (percentage), Germany, 1999

	Working hours per week			
	<15	15-24	>24	Total*
Total	5.9	7.8	4.3	19.5
Size				
5-19	9.9	9.7	4.1	25.9
20-99	6.3	7.0	4.5	18.6
100-199	4.1	8.0	4.2	16.4
200-499	5.9	6.6	4.4	18.2
500 and more	2.5	7.4	4.1	16.6
Sector				
Agriculture, fishery and mining	4.8	3.6	1.9	11.2
Processing of food, textile and wood	4.3	4.7	4.5	13.4
Other manufacturing	1.4	3.0	1.5	6.0
Construction	5.6	3.0	1.1	10.0
Private services	9.3	8.5	4.5	24.5
Education	6.9	17.1	7.3	30.9
Government	2.4	12.4	4.8	19.6
Health care and other public services	8.2	13.1	8.4	35.2

* Including irregular hours (see Appendix 1 for details).

Table 3.3 Share of part-time workers (percentage), Netherlands, 1999

	Working hours per week			
	<12	12-23	24-34	Total
Total	6.6	13.2	11.9	31.7
Size				
5-19	6.6	13.0	9.0	28.6
20-99	4.3	9.5	9.9	23.7
100-199	4.4	11.1	12.8	28.3
200-499	6.2	15.0	16.4	37.6
500 and more	11.3	19.1	14.3	44.7
Sector				
Agriculture, fishery and mining	2.9	5.9	4.7	13.5
Processing of food, textile and wood	3.0	4.9	4.9	12.8
Other manufacturing	1.1	3.2	3.2	7.5
Construction	1.3	2.5	1.2	5.0
Private services	6.6	12.4	9.9	28.9
Education	7.9	21.6	17.0	46.5
Government	2.5	8.9	10.7	22.1
Health care and other public services	14.6	27.1	27.9	69.6

Considerable differences are seen in the education, health care and other public services sectors. Here, the Dutch figures are much higher. In particular, part-time jobs of more than 24 hours per week are more widespread.

Hence, regarding the incidence of part-time jobs, the difference between Germany and the Netherlands can partly be explained by a very high share of part-time jobs in the Dutch public sector (excluding the government sector). Another important factor is the difference in industrial structure between the countries. In Germany manufacturing has a (much) higher weight in total employment than in the Netherlands. With the same industrial structure in both countries, the difference in the incidence of part-time work would be reduced by about one third.

3.4 Characteristics of the IAB and OSA panel and relevant data

The IAB (German) and OSA (Dutch) establishment panels[8] represent all economic sectors and provide comparable information on a large number of variables. The IAB panel started in 1993 in Western Germany. In 1996 the Eastern states also joined the survey. The sampling frame for the German panel is the employment statistics register which is collected via the social insurance procedure. From the establishments included in the employment statistics register a stratified sample is drawn using selection probabilities which depend on the variation in the number of employees in the respective stratum. The fieldwork is done by TNS Infratest Sozialforschung, Munich, whose well-trained interviewers are supported by the recommendation of the Federation of German Employer Organisations. The overall and size-specific response rates are over 70 percent (with the exception of the first two classes). The response rate of repeatedly interviewed establishments in the following waves is above 80 percent. Both values are quite high compared with other establishment surveys.

The panel was created to meet the needs of the Federal Labour Services with the aim of obtaining additional and more detailed information about the demand side of the labour market. For this reason, questions on personnel, changes in employment and the structure of qualifications form a large part of the questionnaire. Beyond this, some questions deal with training, instruction and additional training of employees. In addition, information about working time and overtime work is provided on a yearly basis. Other questions asked annually are on establishment policies, developments in business and investment. Other topics are asked biennially or triennially, for example questions on public employment subsidies or the contact of the firm with the Federal Labour Services. Additionally, every year there is a special focus on a particular theme.

The OSA panel started in 1989 and since then consecutive surveys have been conducted in alternate years. The most recent available data are therefore from the 2003 survey. The sample has been stratified with respect to the sector of economic activity and size class. The questionnaires are quite similar for the different years, and include a lot of information on firm characteristics (main activity, market position, technology), personnel characteristics (gender, age, level of education), working conditions and working time patterns, vacancies, etc. One difference is that the OSA panel does not include establish-

8 See Kölling (2000) or Bellmann (2002) for additional information about the IAB establishment panel. See Fouarge et al. (2001) for the OSA panel.

ments with fewer than five workers. In order to make the two panels comparable, this category was dropped from the IAB data. Another selection was made by restricting the German data to former West Germany.[9] We chose the 1999 data because these are the most comparable for the two countries.

The information regarding working patterns includes a categorisation of working hours, as presented in Tables 3.2 and 3.3 above. In addition, information is available on the operating hours of the organisation. Both panels have (not fully comparable; see Appendix 1) information about the number of workers with irregular hours. Whether overtime occurs is another variable, which is defined as a dummy variable (yes=1; no=0). The Dutch data provide some interesting extra information on part-time work. If there are part-time workers the employer is asked what reason is the most important: the preference of the worker, optimal staffing, or other reasons. Although this information is lacking in the German data, it can be useful for the interpretation of the results for both countries. Appendix 2 provides some information on these Dutch data.

In the OSA data the information about the age structure of the workforce is obtained directly from the panel. For the German data, information on the age structure was added to the panel from the official employment statistics register.[10] In our analysis we use dummy variables for the share of employees aged below 20, 20-30, 30-40 and 50 and older, and take the category 20-30 as the reference group. The gender composition of the workforce is equally available in both datasets.

From both panels it is possible to construct a variable that indicates to what extent an establishment is confronted with labour shortages. However, the underpinning variables are different (see Appendix 1 for details).

For the share of low-skilled workers, the definition differs slightly between the two countries. In the German case it reflects the share of unskilled workers and in the Dutch case it is the share of workers with a low education.

Another variable which differs slightly is the average wage. From the German data it is calculated by dividing the total wage bill in June by the number of workers, whilst in the Dutch case the calculation is based on the frequencies of workers over eight wage classes (obtained directly from the questionnaire). We use in our analysis the average wage per worker. In the OSA panel this is based on full-time equivalents. In the IAB establishment panel, it is possible to divide employees according to their working time by weekly hours worked. We use full-time equivalents for the German data.[11]

The categorisation into five size classes and eight sectors is similar to that presented above in Tables 3.2 and 3.3. As a multivariate analysis shows no significant differences for establishments with more than twenty workers we included only the smallest size class (five to twenty employees) in this analysis. With respect to sectors we take the manufacturing and construction sectors as a reference category.

A full description of the variables is given in Appendix 1.

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9 The structure of part-time work and explanatory variables are different between West and East Germany (see Düll & Ellguth, 1999).

10 The linking of data from the IAB establishment panel and the Federal Employment Statistic Register is described in Bellmann, Bender and Kölling (2002).

11 Part-time employees working more than 24 hours weekly have the factor 0.75, between 24 and 15 hours 0.5, and below 15 hours 0.25.

3.5 Hypotheses

The aim of this paper is to investigate to what extent part-time work can be explained from the demand side of the labour market. Therefore we distinguish between the motives described in Section 3.2. Difference in size and sector are probably related to other aspects that reflect the motives of employers for having part-time jobs. Nevertheless, size and sector were included in a multivariate analysis. Not all sector effects may be caused by other variables that we can include in the analysis. One aspect that we cannot include in the analysis is the 'cultural effect', i.e. the social acceptance of part-time work. There is no doubt that this differs by sector.

One of the most important motives is to meet the *preference of the workers*. The indicators used for this are the gender and age composition of the workforce. Regarding gender we know that more female workers are correlated with more part-time jobs. The influence of the age composition is less clear. We assume that young workers who have finished their education will prefer to work full-time. On the other hand, young people often combine education and work in part-time jobs. In most countries there is a high participation in part-time work of the youngest age group, with Germany as an exception (Delsen, 1995; see also Hoffmann & Walwei, 2000 in a comparison between Denmark and Germany). Workers (especially women) with young children may prefer to work part-time and in several countries parental leave is possible on a part-time basis. Older workers may prefer to work part-time because of health problems or make use of (financially) attractive gradual retirement schemes. In Germany as well as the Netherlands there are a number of regulations (often based on sector level collective agreements) enabling older workers to reduce their working hours without full compensation in wages.

The extent to which employers will meet their workers' preferences can vary with the labour market situation. There are two possible and contrary effects. In a tight labour market employers will probably be more willing to meet the preferences of their workers, and workers will have the feeling that it is a good time to express their wishes. If many full-time workers and/or many new entrants prefer a part-time job (which is the case in the Netherlands) one would expect more part-time jobs in establishments with labour shortages. However, the other side of this coin is that employers will stimulate their workers to work full-time if they are confronted with labour shortages. Which aspect dominates cannot be predicted in advance.

A second, and in some countries the most important, motive is *optimal staffing*. We assume that this is related to differences between the operating hours of the establishment and standard working hours. If the operating time is longer, the probability of part-time jobs will be higher. However, this effect can be mitigated by shift-working by full-time workers. If working hours are not fixed, but depend on fluctuations in labour demand, this can be solved by hiring workers from temporary work agencies, but also by calling in workers who have a contract for irregular hours (sometimes known as a 'min-max' or 'on call' contracts). Most of the latter category work part-time. Thus we can expect a strong positive correlation between irregular (flexible) workers and part-time workers.

A third variable is overtime work. The relationship of overtime working with part-time jobs is not very clear beforehand. One possible assumption is that there is a substitution between overtime work and (part-time) jobs, which refers to an old but continuing discussion (e.g. Ehrenberg & Schumann, 1982). On the other hand part-time workers can often

easily work some extra hours, if needed. For the employer this is often cheaper than asking overtime hours from full-time workers (OECD, 1998).

The third motive is related to *cheap labour*. Although it is difficult to find variables that are directly related to the motivation of the employer, we assume that the share of low-skilled or low-educated workers and a low average wage are good indicators for the cheap labour motive. In both cases we expect a positive correlation with the relative number of part-time jobs.

3.6 Determining factors in (West) Germany and the Netherlands: similarities and differences

In this section we present the result of our regression analysis. Though there might be some arguments for alternative estimation methods, we prefer OLS. The results are easy to interpret and are not different (in terms of the significance of the variables) from e.g. a Tobit model. In the Dutch data, 89 percent of all establishments have at least one part-time job. In the German data the corresponding proportion is 83 percent. In both cases the probability of having no part-time job is (not surprisingly) related to small establishments.[12]

In Table 3.4 and Table 3.5 the results of OLS regressions are presented for Germany and the Netherlands, respectively. The tables have four columns with results for three classes of weekly hours and the total number of part-time jobs. Here, the advantage of the OLS method can easily be seen: the coefficients in the last column equal the sum of the coefficients in the three classes.

Size and sector effects

The size effect is rather similar for both countries. The result for the total number of part-time jobs is not significant but small establishments have more jobs with fewer than 24/25 hours and fewer part-time jobs of more hours. This suggests that the accommodation motive is less important in small establishments, which confirms the Dutch result that optimal staffing is relatively important in small establishments.

Sector effects remain important if other variables are controlled. With manufacturing and the construction industry as the reference, all other sectors have more part-time jobs. All sector coefficients are higher in the Dutch case, with the public services sector (excluding education and government) as the extreme. A further difference between the two countries is that in the German private services sector part-time jobs are concentrated in the classes of fewer than 25 hours. In the Dutch private sector this is the case for more than 23 hours. This is probably a further indication that the optimal staffing motive is stronger in the German private sector.

12 Remember that establishments with less than five workers are excluded, which has a significant effect on the proportion with at least one part-time job.

The accommodation motive

A first aspect that is related to the accommodation motive is the share of female workers. This correlation is strong in both countries (but stronger in the Netherlands), and for all classes of hours per week. In both countries the lowest coefficients are found in the class with fewer than 12 or 15 hours. This supports the assumption that the strong correlation between part-time work and female participation rates is mainly due to the preferences of the workers.

Table 3.4 Estimates for part-time jobs in German establishments (N=2,990)

	<15 hours	15-24 hours	More than 24 hours	Total
Size <20 workers	0.81*	1.05**	-1.14***	0.72
Agriculture, fisheries and mining	1.59	1.27	0.76	3.63**
Private services	1.74***	1.42***	0.73*	3.89***
Public services excl. education and government	0.83	3.25***	2.45***	6.52***
Government	0.17	5.48***	0.86	6.51***
Education	2.53**	8.26***	2.88***	13.70***
Age <20	-0.04	0.01	0.02	-0.02
Age 30-40	0.01	0.06***	-0.00	0.07***
Age 40-50	0.02	0.10***	0.05***	0.16***
Age >50	0.05***	0.10***	0.00	0.15***
% female	0.03***	0.14***	0.11***	0.28***
Manpower surplus[1]	0.01	-0.57**	-0.31*	-0.89***
Operating time/labour time >1.2	-0.37	0.17	0.65*	1.18**
Irregular hours[1]	0.25***	0.22***	0.02	0.49***
Overtime occurs	-0.45	-0.17	1.15***	0.53
% unqualified	0.04***	0.00	0.00	0.04***
Wage (log)	-9.30***	-4.19***	-0.75*	-14.20***
R-square	0.23	0.26	0.18	0.54

[1] See Appendix 1 for details.

A glance at the age composition of the workforce makes it clear that part-time work is more widespread if there are relatively more older workers (reference group is 20-30), with the exception of the category younger than 20 years in the Dutch case. These are probably mostly students. The absence of this effect for the youngest group in Germany is in line with other research. Probably the most important explanation for it is the prevalent German apprenticeship system in which apprentices have a full-time contract with the employer.[13] For the age group of 50 years and older it is remarkable that more part-time work is concentrated in jobs of fewer than 24 hours per week. The effect of gradual retirement by working one day less per week cannot be found. For the age categories 30-40 and 40-50 part-time jobs are in most cases 'half jobs'.

13 In the Netherlands the apprenticeship system is less widespread, and sometimes apprentices have a part-time contract with the employer.

Table 3.5 OLS estimates for part-time jobs in Dutch establishments (N=1,404)

	<12 hours	12-23 hours	24-35 hours	Total
Size <20 workers	1.07	2.91***	-2.30**	1.68
Agriculture, fisheries and mining	1.91	1.89	2.09	5.89**
Private services	0.40	1.18	3.89***	5.46***
Public services excl. education and government	4.31***	9.79***	15.70***	29.80***
Government	1.83	3.73**	2.54	8.10***
Education	8.11***	8.81***	1.35	18.30***
Age <20	0.17***	-0.07	0.22***	0.32***
Age 30-40	0.02	0.06**	0.05	0.13***
Age 40-50	0.02	0.16***	-0.02	0.17***
Age >50	0.13***	0.13***	-0.02	0.24***
% female	0.08***	0.23***	0.19***	0.50***
Labour shortages[1]	-1.40*	-2.27**	0.04	-3.63***
Operating time/labour time >1.2	-1.12*	1.53**	1.83**	2.23**
Irregular hours[1]	0.23***	0.07*	-0.17***	0.13**
Overtime occurs	1.03	1.39*	-4.52***	-2.10*
% low educated	0.03**	0.02*	-0.02	0.03
Wage (log)	-12.20***	-8.36***	3.94*	-16.60***
R-square	0.28	0.44	0.40	0.73

[1] See Appendix 1 for details.

It is interesting to note that manpower shortages and surpluses have different effects in each country. In Germany, labour slack at the establishment level is negatively correlated with the number of part-time jobs. This may indicate that employers are more reluctant to meet the workers' preferences if workers are in a weak position. In the Netherlands this effect cannot be found. On the contrary, there is a negative correlation between labour shortages and the relative number of part-time jobs. Our assumption is that employers are, at least partially, successful in stimulating their employees to work full-time if they need them.

The optimal staffing motive

If the operating time is more than 20 percent longer than the standard working time, there are more part-time jobs. This correlation is the strongest for jobs of more than 23 or 24 hours. This result can be explained by the fact that the operating time is a more or less structural characteristic, which makes long-term personnel planning possible. Optimal staffing can then often be combined with workers' preferences.

The number of workers with irregular hours is highly correlated with part-time jobs of fewer than 24 or 25 hours. This relation is stronger in Germany than in the Netherlands, a result that can be seen as a further indication that the optimal staffing motive is relatively more important in Germany.

The relationship between overtime work and part-time jobs is ambiguous. The most significant correlation is between overtime and part-time jobs of more than 23 or 24 hours,

but the effect does not hold good in both countries. The results are not very convincing, so we draw no conclusions on this question.

The cheap labour motive (secondary workers)

The positive correlation between part-time jobs and the proportion of poorly-educated or unqualified workers indicates the importance of cheap labour in jobs with few hours. For part-time jobs with more hours this relationship is not found. In the Dutch case we may even observe the opposite. The positive relation between part-time jobs of more than 23 hours and the average wage in the Netherlands points in the same direction: only jobs with fewer than 24 hours are correlated with poorly-educated and low-waged workers. This conclusion holds to a large extent also for Germany.

Relative importance of management needs and workers' preferences

If we combine the optimal staffing motive and the cheap labour motive to create a category of 'management needs' it is possible to say something about its relative importance compared with the accommodation motive. However, this cannot be more than an indication, because it does not take account of the size and sector effects. Besides, the categorisation of variables into management needs on the one hand and workers' preferences on the other hand cannot be too precise.

Nevertheless, we shall try to answer the question, and fortunately we can compare it for the Netherlands with the answers to a direct question (see Table A1.1 in Appendix 1). Table A3.1 and Table A3.2 in Appendix 3 present the results of partial regressions. The Dutch variables that indicate the accommodation motive (workers' preferences) have an R^2 of 0.66 and the variables representing the needs of the employer 0.35. These results can be compared with the answers in 1999 to the direct question from Table A1.1 in Appendix 1. Here the workers' preferences had a score of 50 percent against 34 percent for the management needs. Hence, the outcome of the regressions is consistent with the answers to the direct question. In the Netherlands, workers' preferences are at least one and a half times as important as management needs. For Germany the picture is different: both motives are more or less equally important. If the two countries are compared, then the management's needs have the same degree of importance for introducing part-time jobs. However, in the Netherlands the introduction of part-time jobs is (much) more frequently based on the wishes of employees. Of course the question remains whether the preferences of workers are different in the two countries or whether German employers are more reluctant to meet their workers' preferences. That question cannot be answered with our data.

3.7 Conclusions

In the Netherlands part-time jobs are more widespread than in Germany. The reasons for this difference are diverse. An important factor is the difference in industrial structure. In Germany manufacturing has a much higher weight in total employment than in the Netherlands, which can explain about one third of the difference in the incidence of part-

time jobs. Significantly higher proportions of part-time jobs are found in the Dutch public sector (excluding government, but including health care and social work).

A distinction can be made between three motives for employers to introduce part-time jobs: optimal staffing, cheap labour, and accommodation (meeting workers' preferences). These motives are correlated with the number of weekly hours: a small number of hours worked is an indication of the optimal staffing or cheap labour motive. Part-time jobs of at least 24 hours per week are more related to the preferences of workers. The Netherlands has a much higher share of part-time jobs of at least 24 hours than Germany, which is a first indication that meeting workers' preferences is more common in the Dutch case.

A multivariate analysis makes it clear that all three motives have some relevance. Indicators of the accommodation motive are the relations between part-time jobs and the age and gender structure of the workforce. Many women with family responsibilities prefer to work part-time, and the same holds for many older workers. The analysis confirms these relationships for both countries. One difference is the position of young people. Below the age of 20 many Dutch young people in secondary or post-secondary education have a part-time job. In Germany this is less usual, because of the importance of the apprenticeship system (apprentices have full-time jobs). The international literature makes it clear that Germany is an exception in this respect.

The extent to which employers want to meet the preferences of their workers may be dependent on the labour market situation. In Germany, employers tend to have fewer part-time jobs in case of manpower surpluses. In the Netherlands we see the opposite: employers have fewer part-time jobs in case of labour shortages. This difference between the two countries probably indicates different employers' attitudes towards part-time jobs.

The optimal staffing motive is confirmed by the result that operating hours that exceed the standard working hours by more than 20 percent are correlated with more part-time jobs. Another indication is the correlation between the number of irregular jobs with part-time jobs with a small number of hours per week. In addition, some sector effects give extra indications for the optimal staffing motive. Here we can note the higher probability of jobs with a small number of hours in German private services and in the education sector in both countries.

The cheap labour motive is in agreement with the finding that a high proportion of poorly-educated or unqualified workers and a high proportion of low-paid workers are correlated with more part-time jobs. This holds especially for jobs with a small number of hours per week (marginal jobs).

The relative importance of the three motives cannot be ascertained exactly, because part of these motives are hidden in sector effects. However, there is a strong likelihood (confirmed by the answers to a direct question) that in the Netherlands the accommodation motive dominates. In Germany, the needs of employers seem to be more equal in importance to the preferences of the workers.

In summary, we find the following reasons behind the difference in incidence of part-time jobs between Germany and the Netherlands: the difference in industrial structure (more manufacturing in Germany; more services in the Netherlands), fewer working students in Germany, and more reluctance on the side of German employers to meet the preferences of their workers.

Appendix 1: Variables used in the analysis

As a percentage of the total workforce
- Age categories
- Female workers
- Unqualified/low-educated workers
- Irregular workers (definition see below)

Dummy variables 0=no, 1=yes
- Does overtime occur?
- Size less than 20 workers
- Sectors

Log wage: see text

Definition of irregular workers

Germany: difference between total number of part-time workers and the sum of the three part-time classes <15, 15-24 and >25 hours, under the condition that this difference does not exceed 7.5 percent of the number of part-time workers without fixed hours (the total number of part-time workers and a composition of the workforce in classes of hours are different questions at different places in the questionnaire).

Netherlands: workers who are called in case of times/hours of higher economic activity or in case of emergency.

Definition of labour slack/labour shortage

Germany: variable for labour slack: = 0 if all workers were needed for the realised production; = 1 if the production could have been at most ten percent higher with the existing workforce; = 2 if the production could have been ten percent or more higher with the existing workforce.

Netherlands: dummy variable for labour shortage: = 1 if the employer has insufficient employees *and* the reason is that there is scarcity of qualified workers in the labour market; = 0 otherwise.

Appendix 2: Direct information from the Dutch panel

In the OSA panel is asked for the most important reason for having part-time workers in 1995, 1999 and 2001 (please, one answer). In the IAB panel this information is not available.

Table A2.1 presents the results.

Table A2.1 Most important reason for having part-time jobs (percentages of establishments)

	1995	1999	2001
Optimal staffing	42	34	32
Workers' preferences	51	50	56
Apprentices	n.a.	2	3
Partially disabled	3	5	2
Other reasons	4	9	7
Total	100	100	100

The differences between the years are not very significant. Workers' preferences are the most important, but the optimal staffing strategy is also an important reason for part-time work. What factors determinate whether workers' preferences or optimal staffing are the most important reason? It is estimated that optimal staffing is probably the most important reason, and alternatively that workers preferences dominate. The results can be summarised as follows:

1. workers' preferences are more important if the share of female workers is higher and if the share of 30-40 year old workers is higher. Both aspects have probably the same background. Many women have family responsibilities and in general more people have young children between the ages of 30 and 40 years;
2. workers' preferences are more important if there are relatively more part-time jobs of more than 24 hours;
3. optimal staffing is more important in small establishments (<20 workers). This can be understood by the example of a bookkeeper who will not have a full-time job in a small firm;
4. optimal staffing is more important in low-wage establishments and workers preferences have more significance in high-wage establishments. This suggests that the optimal staffing motive is at least partially related to the cheap labour motive;
5. optimal staffing is more important in public services (excluding government and education, but mainly consisting of care and social work sectors) and to a much lesser extent also in private services (especially trade, hotels and cafés).

Appendix 3: Partial regressions

Table A3.1 OLS estimates for part-time jobs in German establishments (N=2,990)

Size <20 workers	6.12***					0.72
Agriculture, fisheries and mining	3.06					3.63**
Private services	12.60***					3.89***
Public services excl. education and government	24.60***					6.52***
Government	15.90***					6.51***
Education	27.20***					13.70***
Age <20		0.17***				-0.02
Age 30-40		-0.02				0.07**
Age 40-50		0.08***				0.16***
Age >50		0.07***				0.15***
% female		0.44***				0.28***
Manpower surplus		-0.46				-0.89***
Operating time/labour time >1.2			1.16		1.03	1.18**
Irregular hours			0.88***		0.53***	0.49***
Overtime occurs			-7.30***		-1.86**	0.53
% unqualified				0.04***	0.04***	0.04***
Wage (log)				-21.20***	-19.30***	-14.20***
R-square	0.23	0.38	0.11	0.28	0.31	0.54

Table A3.2 OLS-estimates for part-time jobs in Dutch establishments (N=1,404)

Size <20 workers	6.57***					1.68
Agriculture, fisheries and mining	7.35**					5.89**
Private services	20.40***					5.46***
Public services excl. education and government	64.60***					29.80***
Government	16.90***					8.10***
Education	40.10***					18.30***
Age <20		0.37***				0.32***
Age 30-40		0.15***				0.13***
Age 40-50		0.21***				0.17***
Age >50		0.21***				0.24***
% female		0.82***				0.50***
Labour shortages		-4.34***				-3.63***
Operating time/labour time >1.2			13.80***		10.20***	2.23**
Irregular hours			0.83***		0.62***	0.13**
Overtime occurs			-21.50***		-14.20***	-2.10*
% low educated				-0.48***	-0.40***	0.03
Wage (log)				-52.80***	-38.50***	-16.60***
R-square	0.57	0.66	0.20	0.26	0.35	0.73

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4 Reflections on mobility in the New Economy

ANDERS EKELAND

Abstract

The paper tries to take stock of mobility studies and policies by discussing the state of the art regarding data, models and policy. These aspects of mobility should be closely related. The initial policy questions should inform data collection and the choice of models. Data synthesised to stylised facts should feed back into the policy formulation and increase the quality of data collection and modelling. There is a tension between the underlying assumption behind the political interest in mobility - that it is too low - and the fact that we really do not have much - if any - theoretical or empirical basis for this assumption. There is a strong tendency to want to maximise mobility, disregarding the fact that the goal of mobility policies must be to find the optimum balance between negative and positive aspects of mobility. In practice we can at best find a sufficiently 'narrow' optimal range of mobility rates, not 'The optimal mobility rate' with a capital 'T'. Theoretically it is clear that we should avoid the extremes, that is, mobility which is too low or too high. But we are still far from having a real empirical basis for deciding what is too high and too low. The fact is that we have not yet resolved some paradoxes in the data. That is – we do not know whether the contradictory and/or unexpected results are due to statistical artefacts or whether they reflect realities.

There is also a tension between the demand for results and the willingness to invest in building up the necessary statistical systems and data collection routines to obtain these results. This reflects the fact that many policymakers think that mobility is generally too low, and that we - more or less - know enough to start implementing pro-mobility measures. When it comes to what kind of measures these should be, then the conventional policy advice is 'more labour market flexibility'. This advice is based more on economic textbook reasoning than on a real, empirically based understanding of labour market dynamics. In addition, there is a lack of real understanding of how difficult it is to decrease or increase mobility if one had an empirical basis for saying that it was clearly outside the optimal range. The possibility of unintended negative side effects is great. If mobility studies are going to advance, one must, on the one hand, convince the policymakers that detailed, micro-data are necessary to answer the optimum problem and, on the other hand, warn them that the data might give different answers from those they would currently like to hear. It might turn out that mobility is already in the optimum range, and if it falls outside this range in some sectors, then more job security and/or more egalitarian wages might be the best remedy.

4.1 The Holy Grail of mobility studies - the optimum range

The core problem of mobility studies is to identify and quantify the negative and positive aspects of mobility between firms and sectors.[1] Theoretically, one might find an optimum,

[1] In Hauknes and Ekeland (2002) we discuss the age composition, i.e. the necessity of an optimum mix of fresh ideas (young researchers) and experience (senior researchers) both empirically and by illustrative numerical examples, but as far as we know, very little has been done so far.

but given the measurement problems, realistically such an optimum value would have a large confidence interval. At one extreme there is no job-to-job mobility at all, only a replacement of those employees who go into retirement. Given 35 years of working life, 86 percent 'gross' mobility would be the result. If working life was 50 years on an average (from 15 to 65 years of age) we would have two percent mobility caused only by retirement. A 'gross' mobility rate of two to three percent, and zero job-to-job mobility means that new entrants to the labour market enter into the firms from which people retire and stay in the same firm for the rest of their working life. If we assume that there is a partial chain reaction so that the seniors retiring are replaced by the next generation of seniors from other firms we will have some job-to-job mobility. From this it is clear that retirement alone will not induce much job-to-job mobility. But a market economy is a fairly dynamic system. A significant share of firms goes out of business each year, and new ones are created and this in itself creates a certain amount of job-to-job mobility. There are also declining and growing sectors, and declining and growing firms within each sector. So even if firms survive, they will change their number of employees. Even if firms did *not* go out of business - or did *not* change their overall number of employees - people would still change jobs for various reasons. In particular, young people are searching and learning, while constantly trying to improve the match between their interests, career prospects, remuneration, content of the job, etc. Since changing jobs sometimes also means moving geographically, a change of employer might also induce spouse and family members to move and change jobs. Altogether this means that a job-to-job mobility rate of three to five percent might be considered rather low. Not necessarily *too* low, but a mobility rate in this range can be used as a first rough indicator for which sectors of the economy could merit further detailed analysis.

4.1.1 An example - academic mobility

An example of a sector where mobility rates close to the 'retirement rate' are to be *expected* is academic mobility, i.e. job-to-job mobility of tenured staff at a university. First of all there is a very long selection/recruitment process with the stated objective of securing that the most able person gets the privilege to do research in a fairly secure position.[2] For centuries the expectation was that you were going to stay in that position, some moving up in the internal hierarchy, with a few moving to other universities, but not moving to another sector of the economy. With 40 years of working life (from 30 to 70 years of age), a 'gross' mobility rate of two and a half to three percent, and close to zero 'out of university-sector' job-to-job mobility rate should be expected, depending on the field of study. In fields like philosophy and linguistics there are very few opportunities for similar work outside the university sector. In informatics a lot of leading-edge R&D takes place in the private sector - and wages have in some periods been considerable higher outside the academy. Also in law and business administration there are more extramural possibilities with significantly higher wages. Seen from the university point of view and maybe from the point of view of society a high rate of mobility out of ICT and law faculties might be negative. The most able academics are drawn away from the universities, leading to a

2 Although teaching is a part of the job, the selection for tenured jobs is made almost exclusively based on academic research merit.

disruption of teamwork among tenured staff, a lack of really senior people to train young researchers and consequently a long-term undermining of the ability to keep up leading-edge research. The private sector will probably benefit from radically increased mobility in the short and medium term; the question is of course the long-term balance of positive and negative effects. It is possible, for instance, that such an increased mobility would be beneficial and create openings for new and fresh forces at the university, that teamwork (regrettably) is not that important in terms of the ways that universities actually work, but if the quality of the research is undermined, then the private sector will suffer from this in the long run. If that is the case, then one should not want very much mobility. A mobility rate of five to six percent out of the university sector would then indicate that a detailed study of working conditions and wages should be conducted.

Instead one should take a closer look at all the other mechanisms of knowledge diffusion from/to the university sector. This has relevance for research on the private sector, joint projects, co-authorship, arenas like conferences, learned societies, etc. In the absence of migration of personnel, these then become the other, 'substitute', mechanisms for knowledge transfer.

4.1.2 High mobility

At the other end of the scale, there are unskilled jobs demanding mostly labour power with little of no need for tacit knowledge and not much job-specific or firm-specific training. In such jobs there might be a very high turnover of persons, with no person staying for a year. Or more realistically one might find a situation with some key persons being fairly stable but otherwise a very high turnover. The turnover might be so high that to compute yearly mobility rates has no meaning. But such jobs are marginal for a number of reasons. Very simple operations tend to be mechanised, and there are tacit components of all jobs. The quality of the job and a worker's attitude to the quality of service will change if there is more stable employment; there are always some transaction and training costs. These factors will make it rational to reduce the mobility. We would guess that in most workplaces a mobility rate over 50 percent is not sustainable, even if there are two distinct categories of 'stayers' (leading personnel) and 'movers' (doing unskilled work). Even 30 to 50 percent means fairly high training costs, constant disruption of teamwork and other difficulties. As a rule of thumb, job-to-job mobility over 30 percent might merit a more detailed analysis. Since the fact that mobility declines monotonically with age is close to a universal phenomenon, one must of course control for the age composition of the workforce.

The most recent example of very high mobility rates is the ICT sector in the dot.com years in Norway. The 'peak' in the year 1998 is clearly visible even with the generous definition of the ICT sector used in the STILE project; see Stimpson and Tielens (2004: 155). Measured by register data, and with a more narrow definition of ICT, the rate was not 15 percent, but around 35 to 40 percent.[3] This was clearly not a healthy or sustainable mobility rate. In the private sector people changed jobs several times a year, leaving

[3] The very turbulent structure of firms, mergers, splits, name changes etc. makes it hard to measure exactly since the handling of firm demography is still underdeveloped in the Norwegian Business Register.

unfinished projects behind, and earning a considerable wage increase without any real gain in productivity, judging from anecdotal evidence in journals like Computerworld. The public sector saw large numbers of people leaving and big problems with recruiting; however this turned just a few years later into its opposite.[4]

4.2 Digitisation and data

One of the really new aspects of the 'new' economy is the digitisation of information. For administrative purposes and for research this opens up quite new possibilities since electronic traces are left behind of a lot of processes to a hitherto unknown degree and these can be made available very cheaply for processing. The examples are legion. Using the customer and supplier databases of firms, national accounts could be build up from micro-data. In combination with EAN codes, use of electronic payment (cards, Internet) this makes it possible to look at the flows of materials, energy and embedded knowledge in the most minute detail. The public administrative and the private commercial registers open up the possibility to study persons' and firms' lives in very great detail and richness. Yet another example is electronic CVs. If they were standardised and machine-readable these would supply a very useful source of career information, of experience and of skills. All in all, this increasing availability of data means that the first condition of an optimal control problem (which we can observe as a dynamic system) is increasingly being satisfied.

4.2.1 Fear, uncertainty and doubt

For the time being the attitudes towards and understanding of the potential of new data lag behind technical developments. This is of course partly explained by a lack of familiarity with the technologies, but a diffuse fear of misuse is the most prevalent mental obstacle. For the time being, only the Nordic countries have regular systems of register data, i.e. where this is acknowledged as pivotal in the national administrative and statistical systems. The Belgian Labour Market Datawarehouse is an excellent example of the development of such a system, demonstrating that if there is a will there is a way. There are matched employer-employee files in some other countries like France, Germany, UK and Italy, but some data are missing. For example in the case of the Belgian Datawarehouse data about a person's highest achieved education are not available. This is no surprise: you need unique identifiers (personal IDs) to be able to join data that are produced for different purposes. But if this were provided, very rich and *very* cheap datasets could emerge.

4.3 The EU - doing the talk, but not the walk

What is really missing when it comes to data is of course a joint initiative from the European Commission, Eurostat, the European Commission's DG Research and IPTS for register data. Given the strong emphasis that mobility has acquired since the Lisbon 2000

4 For a discussion of what could be a public sector response, see Ekeland and Braadland (1999).

summit meeting there is actually no choice. If policymakers want some real, comparative, Europe-wide data then it is necessary to get a system of register data running in most countries. And, as already underlined, the main reason for this is of course not mobility studies, but general administrative needs, such as *e*Government objectives, especially the interoperability of administrative data. The fact that the LFS, for the fundamental reason of its sample size, cannot be the primary source of mobility data was actually obvious from the start. Already the pilot study done by Åkerblom in 1999 clearly showed this. Further studies done using the LFS, in particular the work of Laafia and Stimpson (2001) and Stimpson and Tielens (2004) have demonstrated that it has been worthwhile to explore the limits of the LFS. To compare LFS and register data in no way contradicts the conclusion that register data is the necessary precondition for doing accurate, in-depth mobility studies, as well as most other analyses of social phenomena based on micro-data.

4.3.1 International mobility – no real data at all

When it comes to international mobility of the highly skilled, this lack of understanding, this nearly Freudian '*Verdrängung*', of the need for register data has perhaps been even more glaring. There have been several meetings of experts in Brussels on international mobility. Each time the attitude of the European Commission has been that they did not care too much about error margins in the numbers on international researcher mobility. But the problem was not and is not the unwillingness of researchers in this area to publish very rough estimates. The Commission did not seem to understand that the problem is that there are no data - even the most unreliable and biased - to use as a basis to calculate any error margins. The fact that there exist some data - in the US, Japan, Australia and the UK - although far from perfect - only illustrates how far behind the EU as a whole is lagging in this respect. In the UK there is the International Passenger Survey. In the Nordic register data there are good migration registers, which make such calculations of mobility possible. But even here it is a problem that for historical and practical reasons the educational level of immigrants has not been recorded. This gap has been patched by some large surveys, which provides an acceptable solution in the short run but is far too expensive in the long term. As a consequence, projects have been initiated in order to obtain data on immigrants' education and former occupation(s) into the registers. For analysis based on the existing data, see Graversen, Lemming, Ekeland et al. (2003).

What is needed in this area is of course some improvement in the EU-wide statistical system. There is a need for migration registers that also include the elementary data on a person's education and occupation. To use more money to get researchers to create *ad hoc* datasets, although very interesting and useful as pilot studies, will not bring us much further. To repeat: only registers will do. A survey of immigrants is very useful, but cannot tell you if they work or in which sector they will work in five years time - if they are still in the country. In short, if registers cannot be built or used for legal or privacy reasons that is the end of the story for mobility studies and policies.

4.4 The factual basis for policy formation

While international mobility is characterised by an almost total lack of relevant data (with the exception of the Nordic register data), the situation is better when it comes to domes-

tic mobility. Here the LFS and register data have given us some stylised facts to reflect upon.

The focus here will be on some aspects of the data that need to be resolved before real policy formulation is possible. If we are serious about mobility, i.e. if the conclusion is not already drawn that it is too low and the task is to increase it, then we must be serious about data. In mobility studies comparative studies are fundamental. A mobility rate for one sector is just a number. It is only when comparing this mobility rate to the rate in other sectors, and not least to the same sectors in other countries, in short by comparing them with other rates, that these numbers can really become meaningful. Using the EU LFS we get Table 4.1, recently published by Eurostat.[5]

Table 4.1 Job-to-job mobility, HRST (Human Resources for Science and Technology), males

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Belgium	4.90	4.76	5.82	5.77	6.80	6.49 b	7.43	6.45	7.57	5.45
Czech Rep.	:	:	:	:	6.60	4.62	:	:	5.13	4.64
Denmark	8.37	10.60	10.85	9.04	11.15	10.99	11.33	12.70	12.15	11.17
Germany	6.80	6.91	5.84	5.87	:	6.91	6.84	7.62	6.72	5.63
Estonia	:	:	:	:	13.04	9.91	11.00 u	: u	11.27 u	: u
Spain	:	:	:	:	:	5.13	5.16	6.38	5.21	5.72
France	:	5.92	5.88	6.35	6.66	7.15	7.67	8.41	8.32	:
Ireland	6.79	6.93	8.13	8.14	:	:	:	:	:	:
Italy	:	:	:	:	4.02 b	4.35	4.35	5.22 p	:	3.92
Cyprus	:	:	:	:	:	6.25	8.01	6.64	6.26	8.16
Latvia	:	:	:	:	:	:	:	: u	8.14	11.42
Lithuania	:	:	:	:	:	:	:	9.33 b	8.90	5.24
Luxembourg	4.72 u	3.54 u	4.00 u	3.46 u	:	5.76	5.48	7.06	5.01	3.66 u
Hungary	:	:	:	5.58	6.19	5.35	4.56	4.90	3.79	4.70
Malta	:	:	:	:	:	:	:	:	: u	: u
Netherlands	:	:	5.21	5.88	8.71	7.82	:	:	:	:
Austria	:	5.59	5.49	: u	:	:	:	:	:	5.53
Poland	:	:	:	:	:	:	:	6.80	6.04	6.53
Portugal	:	:	:	:	6.91	7.16	6.99	5.75	5.97	5.78
Slovenia	:	:	:	:	:	:	7.24 u	5.26 u	4.20 u	5.52 u
Slovak Rep.	:	:	:	:	:	:	:	2.59	2.54	:
Finland	:	:	:	:	9.81	10.25	9.99	11.49	9.78 b	9.02
Sweden	:	:	:	6.63	9.83 p	:	:	5.78 bp	4.55 p	3.55
UK	8.15	8.74	9.42	10.39	:	11.06	11.49	12.50 b	11.25	10.21
Iceland	:	:	:	:	:	:	12.70	16.28	13.50	:
Norway	:	:	:	8.95	12.27	7.01	7.98	8.11 p	6.36 p	6.11
Switzerland	:	:	8.53	8.47	10.14	9.85	10.31	:	9.12	7.71
Romania	:	:	:	:	:	:	:	:	5.16 p	3.49

b: Break in series (see explanatory texts).
u: Unreliable or uncertain data (see explanatory texts).
p: Provisional value.
Source: Eurostat

5 Thanks to Håkan Wilén and colleagues at Eurostat for providing me with this table.

There are several striking features of this table. The first of these is the lack of data for many countries. This negates the major asset of the LFS: that it should be the basis of comparative studies. Without data for at least ten years, serious comparative studies of mobility cannot be carried out. The lack of data is a bit surprising because at this *very aggregate* level - the LFS should be able to give reliable data. Looking at this table the conclusion that mobility is 'too low' in many countries seems to be empirically confirmed. In the Slovak Republic it is only 2.6 percent - close to the rate demanded by retirement alone. But there is reason to be sceptical. Is this mobility between firms (legal units) or establishments (workplaces)? The intention is that it should be firms, and, since there are multi-establishment firms, the firm rate is two to three percentage points lower than the establishment rate. We should calculate all the three possible units - establishment, firm and firm group. However we have reason to believe that the establishment rate is the primary rate. The mobility between workplaces, the change of competence milieu, is the real, physical mobility. That is how human mobility-mediated knowledge diffusion takes place. If we only use the rates based on the legal units, i.e. the firm and firm group, the same mobility between establishments could be lowered just because of changing ownership structures. In periods of mergers, buy-ups, and the creation of (even bigger) multi-plant firms, this could mean significant downward bias. Is the low rate in the Slovak Republic a result of the heritage from the command economy with its big integrated units? Or is it just a statistical artefact? And will these numbers be corrected in coming years?

One reason for asking this question is that Eurostat published a similar table some years ago (Laafia & Stimpson, 2001) and there are some marked differences. In this table the rate for Italy was very low, close to the Slovak level, and the rate for Spain was very high, among the highest in Europe, as is clear from the table below.

People with first-hand knowledge of the labour marked in both Spain and Italy could not offer any real explanation why Spain and Italy were so different. The sharp drop in the Spanish rate from 1998 to 1999 was also hard to explain. The frequent use of temporary contracts until a change in the laws regulating their use in 1999 was put forward as a possible explanation. If it was true, that would have been an important finding - that a change in the legal framework could decrease mobility so dramatically. Or maybe it just changed the statistics? We do not know. Probably the numbers were not reliable enough, since Eurostat has taken out of the table the numbers previously given for Spain and Italy.

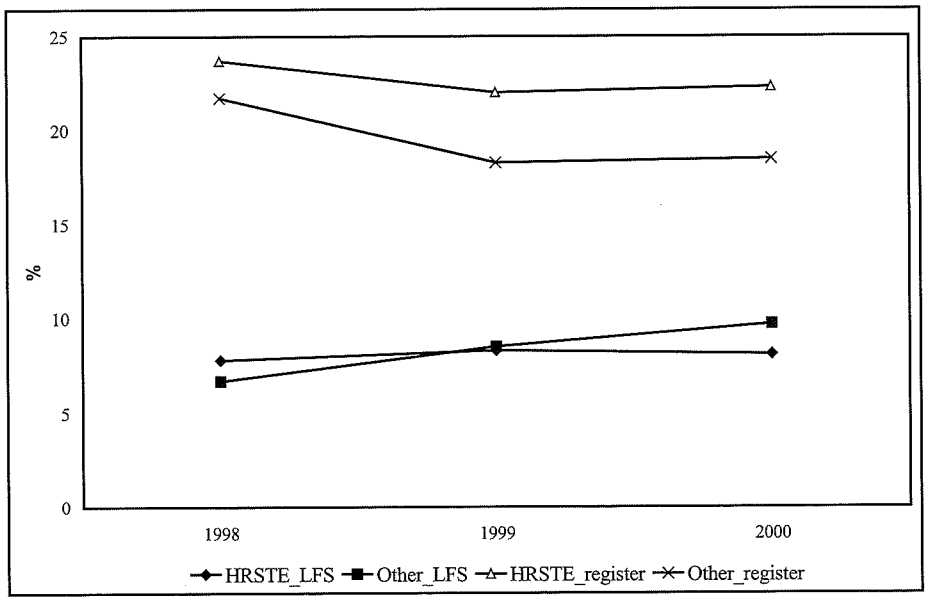
The point here is not to discuss whether that was a correct decision, but to point out that it clearly indicates that we still do not have a firm empirical foundation for analysis and policy formulation. The gaps in the table must be filled the numbers must be 'reasonable', i.e. be confirmed both by 'common sense' and by other sources, primarily register data.

4.4.1 Register mobility rates versus LFS rates

It was evident from the start that there was a marked difference between the EU LFS rates and the register data mobility rates. If one compare the tables reproduced above with the overview given in a Nordic comparative project (Graversen, Ekeland et al., 2003), this is clear. There are differences in definitions and the breakdown by age and groups, making

the rates only roughly comparable, but still it is clear that there is a stable difference, of five to ten percentage points, in the level of the rates.

In Vandenbrande (2001) and in the STILE project (Stimpson & Tielens, 2004), the difference between the Belgian LFS and the register data is not marked. Are they calculating the rates in a different way? Are the data collected in a different way since they do not get significant difference between registers and LFS rates? On the other hand in the NESIS project, Virtaharju, Åkerblom and Roessingh (2003) have studied this problem in detail for Finland for the year 2000. They conclude that there still is an unexplained difference. The difference is more than ten percentage points in the year studied. The LFS mobility rate is 8.6, whilst the register data mobility rate is 21.9. This is at the establishment level, which should be the unit in both sources. But even if we take the firm level in the register data, the total register-based job-to-job mobility rate is 16.9 – still double the LFS rate. Figure 4.1 illustrates this striking difference.



Virtaharju, Åkerblom & Roessingh, 2003: 25

Figure 4.1

Virtaharju, Åkerblom and Roessingh also compared the data from the LFS and register data on an individual basis, but no obvious explanation for the discrepancy was found. We can presume that sooner or later we will find out the reasons for this striking difference. What is clear is that one cannot formulate mobility policy in Finland with two high-quality sources disagreeing to such an extent.

4.5 Mobility policies - scope and objectives

There are two types of mobility-stimulating policies that should be distinguished from each other. The first is the exchange scheme, like the Marie Curie scheme, visiting scholarships, etc. An exchange is built on an agreement between the receiving and delivering institution, often initiated or mediated by a special agency. Such schemes are in general very positive. Even though a return is planned they might result in a permanent job change. This does not necessarily take place in the visited institution; this could simply provide an opportunity to learn of new possibilities. The job change might not be primarily career or scientifically motivated; it might be related to personal motives. The second type of mobility-stimulating scheme is one about which we would be more sceptical. These are schemes, encouraged either by targeted subsidies or by some combination of legal and financial incentives, that can be illustrated by an example from Norway where, in the period 1993-95, a scheme was initiated for stimulating researchers in public research institutes to move to others, primarily in the private sector, and *vice versa*. The first reason for scepticism is the low probability that they will actually result in the desired type of knowledge diffusion i.e. top researchers going to industry. In reality, the likelihood is that institutes will use such a scheme to get rid of the 'misfits' - researchers who for various reasons are not well-adapted to the way the institute is working. Secondly, such schemes are utterly marginal. As the Norwegian case showed, the mobility-stimulating scheme maybe increased the flow of researchers by two to four percent. So if the original rate was ten percent, the scheme increased it to 10.4 percent. The cost of moving a researcher to the private sector was somewhere between the net and gross annual salary of the researcher depending on the exact calculations (Hauknes & Ekeland, 2002: 42-45). The cost of the Research Council of Norway Mobility Programme was 0.6 million euro per year for five years. With such high costs, this cannot be continued on any large scale in any case. But the probability that this is to a large extent wasted money even on a small scale is very high. There are other means of knowledge diffusion that are much more cost efficient, such as supporting conferences, networking and research programmes.

4.5.1 How to decrease or increase mobility

The 20 percent job-to-job mobility rate in Finland seems rather high. If this is the average rate, the implication is that in the most dynamic sectors, such as ICT, it is likely to be around 35 percent.[6] This suggests that one third of employees quit/are recruited each year in these sectors - with the corresponding costs of training, key persons leaving unfinished projects, etc. This has probably changed since the bursting of the dot.com bubble, but it nevertheless poses the question how to reduce mobility in an overheated sector. What kind of policy would be needed to reduce the overall mobility to five per cent, and to at least ten percent in the ICT sectors? It is not easy to see how this could be done. But ensuring a supply of appropriate ICT skills could be achieved by increasing the capacity of the education system. In Norway there was a clear underinvestment in education capacity in the early 1980s and this created a scarcity of ICT skills, leading to very high mobility in the late 1990s. To have a generally high educational level (for instance, a

6 Virtaharju, Åkerblom and Roessingh (2003) calculate a figure of 36.2 percent in 2000.

goal that the majority of a cohort has three to four years of tertiary education) might be a good policy to guard against a very uneven balance of power in the ICT labour market. Highly-skilled people are more easily reskilled, and an alternative group of highly-skilled people is a better back-up than a group that is significantly less skilled. In policy documents there is no discussion - or even mention - of the possible need to decrease mobility, although that might be just as necessary as to increase it.

4.5.2 Increase mobility = increase labour market flexibility = increase wage differences?

In the Belgian case, one might want to increase mobility, maybe up to the Finnish levels. That would mean increasing it by at least ten percent, to around 13-14 percent if we believe that the rates calculated so far reflect reality, and that the Finnish rate is the optimal one. It is indeed possible that the Finnish rate may be a little bit high, given the restructuring of the Finnish economy after the break-up of the Russian market, in itself increasing mobility both in the short and the medium term. A preferable goal might be to aim for ten percent mobility. But how is this to be done? Up to now, researchers have been mostly concerned about obtaining data and making the first comparative analysis, and, as we saw above, there is still a lot of work to be done before we have a solid empirical basis for policy formulation. Consequently there has been little discussion about how to change mobility rates either upward or downward. In most EU, OECD and national policy documents there is no discussion of whether the rates are too high or too low; it is taken for granted that they are too low. A typical example is a recent OECD document 'Developing highly-skilled workers: a review of Norway' (OECD, 2004). This report characterises the situation in Norway in the following way:

> Norway has lower mobility rates for highly-skilled workers than other Nordic countries and little personnel movement between the public and private sectors. As in other OECD countries, overall worker mobility increased in the mid-1990s as economic conditions improved in Norway. However, the Norwegian information technology sector had a very low mobility rate before 1995 and, despite increases in the late 1990s, worker movements into and out of the sector are still far below other Nordic countries (Barth & Schøne, 2001).

No source is cited for the claim that Norway has the lowest mobility rates of the Nordic countries. The reference to Barth and Schøne (2001) is misleading. Their study has no Nordic comparative data. It is focused on mobility between the private and public sectors in Norway. Furthermore, no benchmark is offered to explain why it is considered too low. The big public labour markets of education, health and care do not have any private counterparts. So if they were privatised this might not increase the mobility to other sectors since these sectors are 'self-contained'. The fragmentary comparative data that we have do not confirm that Norway has the lowest ICT mobility rate. The Laafia and Stimpson (2001) table did not show this and neither does the recent table from Eurostat. The register data show higher rates in Denmark and Finland than Norway and Sweden in the early and mid-1980s, but convergence in the late 1980s (Graversen et al., 2003). The latest comparative data are from 1998. The Stimpson and Tielens (2004) data, albeit very fragmented, shows Norway having the highest single rate in the ICT sector for males in 1998 of 19.4 percent. No data is available for females because the sample size is too small.

But even if it were clear that Norway had significantly less mobility overall, in ICT and between the public and private sectors, compared with the other Nordic countries, the (fragmentary) data still indicate that mobility is relatively high in Norway compared with the rest of Europe and in the same range as the other Nordic countries. In fact it is ten percentage points higher than in Belgium if we are to believe the register data. And that is before taking into consideration unemployment, the search activity of young people and the sectoral structure of the economy (which makes a difference because some sectors typically have much higher mobility than others). But let us assume that Norwegian mobility is too low.[7] What does the OECD propose that Norway should do in order to achieve higher mobility? Here is the OECD's analysis of the causes of the low mobility rates:

> Certain rigidities in the Norwegian economy may impede the production and allocation of skilled resources in line with business demand. A large public sector, extensive government involvement in the economy and a centralised wage formation system have led to weak wage signals, low worker mobility and structural problems in re-allocating resources across sectors.

And the 'medicine'?

> '...more privatisation of industry and enhanced links between industry and academia are needed to preclude skill mismatches. Providing for the portability of pensions is key to greater mobility between the public and private sectors. Modifying wage negotiations by taking into account sectoral, skill and local conditions could enhance labour market flexibility and worker mobility.' (OECD, 2004: 3)

It is not obvious why increased privatisation of industry would do anything to preclude skill mismatches. The same goes for enhanced links between academia and industry. Everybody is in favour of the portability of pensions. The significant question here is whether the portability should be based on the good pensions of public employees or on the not-so-good pensions of private sector employees. And if portability were to be implemented one way or another it is far from clear that more people would move. The example of intra-Nordic migration is illustrative. Despite very low administrative and legal barriers, the results of a conscious effort, people do not migrate much between the Nordic countries. Living conditions are roughly the same, so people only move for love, special career needs, etc.

When it comes to the centralised wage formation system leading to weak wage signals it is far from obvious that greater wage differentials would increase the kind of mobility we want, and, if so, that the increase in mobility would be greater than the negative macroeconomic effects. On the individual, micro-economic level, increased wage differentials give people signals to move, but they also lock people into high-wage jobs and positions. A classic example is engineers and researchers who have to be promoted into administrative management jobs in order to obtain highly-paid jobs in a firm. Once they and their families have got used to this new level of income, it is not easy to go back to engineering and research again. Another example is medical doctors in Norway. Due to a monopolistic control over supply, medical doctors have relatively good incomes. Consequently there are a lot of young people wanting to become medical doctors. You need

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7 Norway's has had low unemployment and a fairly good growth rate the last decade, so macro-economic indicators are no reason for sounding the alarm.

extremely good marks to be allowed to study so the profession attracts young people who are able to discipline themselves and are able to learn from books. But working as a medical doctor is in reality rather craft-like, with a lot of routine. Furthermore, human relations are very important; in short, it is not so 'bookish' at all. In any case, when you choose to be a doctor you are young. But since it is relatively so highly paid and has such high prestige these young people get locked in. The symptoms of dissatisfaction have become a topic of debate. Doctors can get professional aid for this career problem,[8] unlike other academics who can change their field of study and occupation with much less loss of income and prestige. It is beyond the scope of this paper to discuss the lock-in of medical doctors or other professionals. The point is that this negative lock-in effect of wage differentials is almost completely overlooked.

4.5.3 How large must differentials be?

The next question is of course how large these wage differentials must be in order to work. As Barth and Schøne (2001: 80) point out: 'for the higher educated we have a significant enduring wage gap in favour of the private sector. At the same time we do not have any dramatic flow of persons from the public to the private sector.' There might be several reasons for this, for instance, greater job security in the public sector or more interesting and challenging work. During boom periods people from the public sector do move to the private sector. This is a stylised fact from Nordic mobility studies. The reason for this appears to be a combination of an increased number of job openings and the feeling that even if you find that the new job was a mistake it will be easy to get another one, i.e. there is less risk. This implies that the present wage differentials have their intended function: people move from the public to private sector *when the opportunity arises*, but do not do so to the same extent in ups and downs of the business cycle. In the downs the opportunity for public sector employment functions as a buffer, as a stabiliser of the economy. As argued above, it might be beneficial that the wage differentials are not so significant, since this will mean that people choose their careers from personal interest. It is obvious that interested and engaged persons are more innovative than persons who are only motivated by high earnings. In other words, does the private sector want people who fundamentally would prefer to work with people or administration in the public sector rather than with technological innovation in the private sector? This question needs at least to be posed, because the more wage differentials are increased, the more the possibility of lock-in will increase.

4.5.4 The macroeconomic effects of increased wage differentials

Finally, a few words on the macroeconomic effects of wage differentials should be added. One might argue that small wage differentials are beneficial for innovation. This has been a conscious policy in the Nordic countries. In the 1950s and 1960s it was called 'rationalisation' or 'increasing efficiency', but the fact is that when wage differentials are small, labour becomes expensive and creates stimuli for mechanisation, for real savings of

8 One example is an article in the professional journal of Norwegian medical doctors, 'Medisinsk grenselos for leger på feil hylle', *Tidskrift for den norske legeforening*, 2001(121): 376-7.

labour. An economy does not get rich by having poorly paid people manually wash other people's cars; you just get less aggregate demand and a more polarised society - not more welfare.[9] This is one of the reasons why the Nordic countries have done so well since World War II.[10] If this argument is correct then there are negative macroeconomic effects. Are they worth the possible gains from more mobility? Should we take such a risk when we only have very fragmentary and/or contradictory data - the LFS versus the registers? And even if we feel that we know the level of the mobility rates, we still do not have any empirical basis for deciding whether we are in the optimal range or whether the costs of changing the rates are less than the macroeconomic costs.

However such dynamic mechanisms are constantly overlooked in the kind of advice given by the OECD, that is an advice based on elementary textbook economics. The fundamental problem with textbook economics is that is static; at best it is 'comparative statics'. This kind of reasoning does not describe or analyse the real *dynamics* of economic processes that evolve over time and interact, processes with feedback loops of different strength and speeds between educational choice, wage structure, innovation and other factors.

4.5.5 Summing up

The reflections in this article start from the fact that there are several positive and negative effects of mobility at various levels with differing time horizons. This makes policy formulation difficult, but not impossible. However, it makes it very important to have rich, high quality, longitudinal data. This means that register data is a *sine qua non*. The LFS has a fundamental problem with sample size that makes it unsuitable for measuring mobility. The LFS should be a supplement to register data focused on the subjective aspect of labour market processes.

Nevertheless, in the short run the questions in the LFS should be updated and standardised because at a very aggregate level the LFS is currently the only basis for comparative data, and comparative data is a must.

Among policymakers there is not enough awareness of the need for data and for the hard work needed to weed out all data errors and statistical artefacts to establish what the level of mobility really is. Once this is done, we will have to analyse these numbers and relate them to other knowledge diffusion mechanisms in order to try to quantify the effects of mobility. Seriousness regarding mobility is manifested by serious efforts in obtaining the data. But the research community must also, after the explorative efforts made since the late 1990s, formulate a clear data acquisition strategy in order to challenge the inertia and the short term agendas of the policymakers.

When it comes to policy formulation, the problem is a widespread attitude that current mobility is too low and a naïve belief in the advice given by textbook economics regarding how to make labour markets more flexible in order to increase knowledge diffusion and innovation. It is possible that these intuitions are correct, but it is the task of the research community to point out that so far they have a weak empirical foundation - and that there is an urgent need to understand the actual dynamics of labour markets.

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9 For a discussion of these issues, see Barth, Moene and Wallerstein (2003).

10 For a non-textbook analysis of competition, innovation and growth, see Baumol (2002).

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5 A cost benefit assessment of administrative databases and surveys in measuring labour market mobility

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Abstract

The focus of the paper is a comparison between two sources of information to describe labour market mobility available in Finland and other Nordic countries: administrative registers and the LFS. Both sources are assessed from a cost- benefit perspective. An attempt is made to analyse the quite substantial differences in mobility rates derived from registers and the LFS and to discuss probable explanations. The paper is based on a more extended paper on the measurement of knowledge stocks and flows produced as the final deliverable of the NESIS (New Economy Statistical Information System) project.

5.1 Introduction

Issues of job mobility appeared as a topic on the policy agenda during the late 1990s, especially in connection with the evaluation of national innovation systems. The OECD initiated a major project on this topic, the so-called NIS (National Innovation Systems) project. Part of this project was concerned with human resources mobility. On the measurement side, the work started with an inventory of available data sources (Rosengren, 1998). A more in-depth study of the feasibility of various survey instruments, especially the European Commission's Labour Force Survey (LFS), for the measurement of mobility was made in co-operation with Eurostat (CAMIRE). A shortened version of this study has been published in the STI (Science, Technology and Industry) Review of the OECD (Åkerblom, 2001). On the basis of this study Eurostat (CAMIRE) started the development of mobility indicators at the Community level.

As part of the work in the focus group on human resources mobility led by Norway within the NIS project, the Nordic countries explored the use of register data for the measurement of mobility (Nås et al., 1998). This analysis was further developed in another Nordic project, the results of which were published by the STEP (Centre for Innovation Research) group in six papers (STEP reports 09/14/2003). These are downloadable from http://www.step.no along with other documents (Nås et al., 1998).

Workshops were also held to bring together all possible experience in the field of mobility measurement. The results of all this work is documented in the OECD publication 'Innovative people, mobility of skilled personnel in national innovation systems' (OECD, 2001).

The results of the studies using registers have differed markedly from results based on surveys like the LFS. Generally speaking, mobility rates seem to be around twice as high when calculated from registers compared with other sources. In order to facilitate the

interpretation of these data some further research is needed on the possible reasons for these discrepancies and to analyse various features of registers compared with other sources in more detail.

This paper is divided into four parts. In the first part, some basic methodological issues concerning the measurement of mobility are discussed. In the second, the data sources are described in more detail. In the third, a comparative analysis is carried out. Finally the conclusions that can be drawn from this analysis are discussed.

5.2 Methodological aspects

5.2.1 Introduction

In this section, we will first discuss various basic concepts related to mobility analysis and give some recommendations based on our experience. We are primarily interested in mobility analysis as a measure of knowledge flows. Formal education is a measurable aspect of knowledge stocks at the level of individuals as well as organisations and flows of this knowledge could be measured by studying the mobility of employees. The carrier of the knowledge being measured is the individual, but the analysis is done by using certain types of organisations as statistical units. These are discussed in Subsection 5.2.3.

5.2.2 Basic concepts of mobility

Mobility can be defined in many different ways. Perhaps the most common way of defining mobility is geographical mobility, i.e. movements from one place to another either within a country or between countries. Movements between various occupations have also been studied. The focus in these studies is on class mobility and not so much on knowledge flows. In this report mobility is defined as a shift of employer (workplace) or of employment status. There are two different aspects to this definition: whether we should analyse inflows or outflows; and whether we should analyse mobility within employment (narrow) or also flows in and out of employment (wide). Combining these aspects gives four different possibilities for defining mobility (mobility in/narrow, mobility in/wide, mobility out/narrow, and mobility out/wide).

Mobility in or mobility out (inflow or outflow)

First, we have to determine whether we analyse *mobility out* (changes between year t and the following year t+1,) or *mobility in* (changes between years t-1 and t). In *mobility in* we are analysing the sources (or 'donors') from which those shifting employment between years t-1 and t are coming, In *mobility out* we are analysing the destinations (or 'recipients') to which those shifting employment between years t and t+1 are going. There is no conceptual difference between these measures; which one we use depends on what we want to study. From the employers' point of view, it is more meaningful to follow flows from education to employment with the *mobility in* approach. On the other hand, if we are interested in how the education system is performing or how efficient it is, the outflows are more meaningful, as it is in this case more useful to know where students go after

education (whether into employment or not) than it is to know where they were before they entered education.

The *mobility in* approach seems to be more appropriate for countries using LFS, because information is asked about the situation one year before (for more details see Section 5.4 on data sources below). Countries using registers can use both approaches.

Narrow or wide mobility

There are also two basic dimensions to the definition of mobility: one narrow, on the basis of changes of employers (job-to-job mobility); and one wider (overall mobility), on the basis of changes of employers or employment status (unemployment, outside labour force, immigration or emigration). Which one to use must again be specified according to the research interest. The mobility rates are quite different depending on which of these definitions is used.

For many purposes the narrow definition seems to be more appropriate for the analysis of knowledge flows.

5.2.3 Statistical units

Mobility is used to measure knowledge flows as the person who moves to another employer brings along/carries away the accumulated knowledge (human capital) he/she has acquired over the years. From the innovation system point of view it is not fully evident which unit of analysis is the best. Change of employer can be defined on at least three different levels (firm, establishment or change of both).

Establishment level mobility

The most disaggregated level is the establishment (the local unit of activity or local site according to EU terminology). In practise the establishment could be a factory or a part of a larger organisational unit located in a particular place. An advantage with the establishment unit is that it is fairly stable. It is not necessarily affected by organisational changes in the firm or the organisation behind it. However, it can be the case that new establishments may be registered (in other words, that new identification numbers appear) purely due to organisational changes. This could be corrected for by regarding the establishment as old, if a certain portion of the employees in the establishment with the changed ID number remain the same. Another aspect of mobility concerns changes between establishments within the same firm. It is in these cases difficult to judge if any knowledge flow (the topic in which we are interested) has taken place. In any case mobility between the establishments of the same firm is a different kind of mobility compared with mobility between establishments belonging to different firms. A high level of mobility within the same firm could be regarded as something positive for the firm, whilst mobility between firms might generally be seen as something negative for the donor firm although positive for the recipient firm, but should be at the optimal level for the economy as a whole. In some countries information at the establishment level is more readily available in the private sector and calculations at that level are technically more feasible. In other countries the opposite situation may apply. In particular, registers in the public sectors are

not fully developed at the establishment level, which may cause difficulties in using the establishment as the unit of analysis. The classifications are also dependent on which unit is used for analysis. For example, the identification of whether employees fall within the ICT sector will be different depending on whether it is the establishment or the firm that is coded.

Firm level mobility

The actors in the innovation system are organisations (firms, institutes, universities, etc.). If the knowledge embodied in employees is regarded as an intangible asset, the firm unit may be more appropriate, since financial accounts and human resources records are normally kept at that level. The employer concept is also more closely related to the firm unit than to the establishment unit. The disadvantage with the firm unit is that it is more unstable than the establishment unit due to trading of establishments between firms and reorganisation of establishments. Firm-level mobility includes mobility due to shifts of establishments from one firm to another even if no job shift has taken place. A knowledge flow has taken place but it is nevertheless a rather special kind of mobility. For both kinds of unit, however, it is essential to adjust for artificial changes in identification numbers that are not due to any real changes in the units.

Mobility based on change of both firm and establishment

A third option is to define mobility as a change of both establishment and firm. Not surprisingly, this gives the lowest numbers, as can be seen from Figure 5.1. Some of the disadvantages of using either firm or establishment units are nevertheless eliminated by taking this combined measure.

Some comparisons of mobility rates based on various units

In Figure 5.1, comparisons of mobility rates are made using the establishment and the firm level definitions (Virtaharju & Åkerblom, 2003). The narrow definition (job-to-job mobility) has been applied in order to reveal the differences in rates more clearly, by excluding flows from outside employment. The firm level and establishment level mobility rates have been computed based on changed firm and establishment codes respectively. Furthermore, mobility rates have also been calculated based on the criterion that both of these codes have changed. This excludes from the mobility rate cases where people working in the same establishment have been transferred to a new firm. The computed mobility rates behave much in the way we might expect: when we apply a more restrictive definition, the rates decrease. At the firm level the rates are lower than at the establishment level and they decrease further if we require change in both firm and establishment levels. If we require that both the firm and the establishment must have changed for an employee to be counted as mobile, the mobility rates decrease substantially. In Finland a considerable part of establishment-level mobility takes place within firms. For international use, the firm-level unit could be recommended as the statistical unit of analysis, as the use of this may be more independent of the statistical sources. For

example, in the LFS, the firm seems to be the most common unit, even if the establishment should be the unit according to LFS regulations.

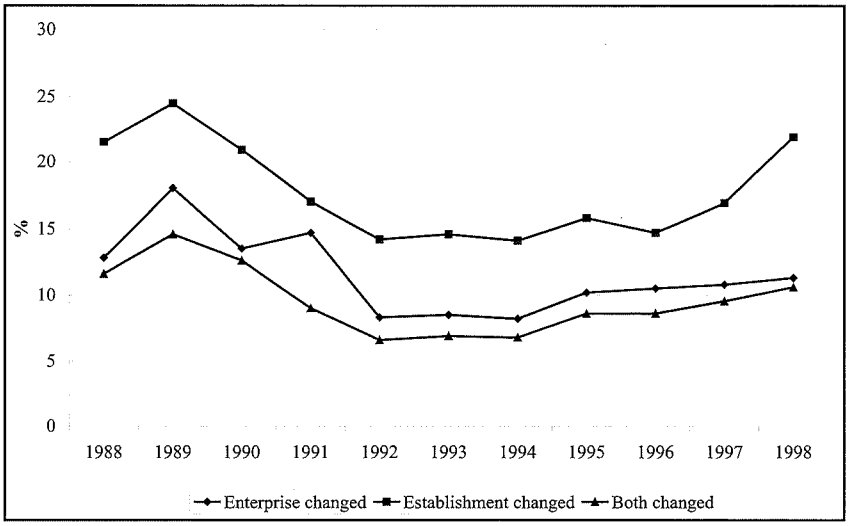

Figure 5.1 Job-to-job inflow mobility rates at establishment, firm and both levels, Finland

5.3 Possible data sources for indicators on mobility

In this section, the two main sources of information on knowledge stocks and flows, the register-based system and the LFS, are first described in more detail. Then two other possible sources of information, the population census and special surveys, are discussed.

5.3.1 The register-based system

In all the Nordic countries employment statistics are compiled from the dual data sources of population registers and other administrative records. Among the main advantages of register-based statistics are the lower costs of production, the elimination of any additional response burden, and further uses of the available register data. The most important feature is the annual availability of total data for the whole nation and for smaller geographical areas and small population subgroups. For example, the register captures short spells of activity or conditions, as well as multiple or side activities, such as employment among students, second or third jobs, and so on. Data quality is also better for items that would otherwise involve long-term memory or detailed records. The coverage of the data is usually high. There is much supportive information for instance for the coding of occupations, educational data, and data describing employers (size and industry of employer). The possibility to link various types of datasets such as demographic and business information is also essential for research purposes.

All the relevant data are compiled into annual databases. A greater number of cross-tabulations of data from different databases will be made in a census year than during normal years of data compilation. Data concerning the population's economic activity are compiled yearly into employment statistics; the main data sources for this are the following:

- the Population Information System of the Population Register Centre (including data on buildings and dwellings);
- registers maintained by the tax authorities (on incomes, wages and salaries, benefits, etc.);
- employment registers maintained by the Central Pension Security Institute, the State Treasury and the Municipal Pension Institution;
- Statistics Finland's Register of Enterprises and Establishments and Register of the Non-corporate Public Sector;
- the pensioner registers of the National Pensions Institute and the Central Pension Security Institute;
- student registers;
- the Ministry of Labour's Register of Job seekers;
- Statistics Finland's Register of Completed Education and Degrees;
- the Register of Conscripts.

Data are linked between persons, incomes, employment, unemployment, and pension periods, buildings, dwellings, firms, workplaces (establishments), education and places of graduation.

Figure 5.2 illustrates these linkages in graphical form.

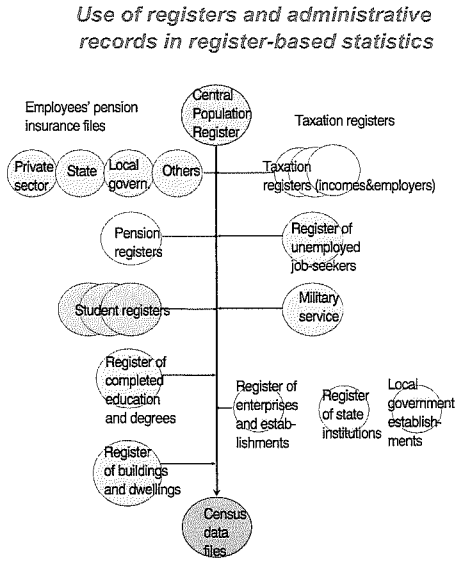

Figure 5.2 Use of registers and administrative records in register-based statistics

All register units as well as addresses are updated continuously or at least once a year. Registers can also be used to draw samples of certain populations such as age or income groups or specific geographical areas. Registers are furthermore used to reduce the number of questions that respondents are asked in sample surveys on subjects like demographics, education and family (family and household combinations). Their third use is to determine the characteristics of survey non-respondents (for example, age, gender, employment status, and place of residence).

Since 1987, Statistics Finland has produced an annual and even a monthly database for the entire population. Information is produced for the whole country as well as for smaller areas such as municipalities and parts of cities. This description of the register-based system is based on Myrskylä, Parjo & Virtaharju (2002).

5.3.2 The method of the Finnish LFS

The Finnish LFS is a continuous panel survey based on a sample. The data are collected by interviewing the members of the sample. The person interviewed is questioned about his/her labour force participation, employment, unemployment, occupation, status in employment, use of time, type of employment relationship, days and hours actually worked, overtime and secondary jobs, and normal working hours. A total of 130,000 persons are interviewed each year with the sample being drawn from the population register. Random selection is applied by region in proportion to population weights.

5.3.3 Population censuses and special surveys

Data corresponding to register data is usually available from population censuses made in most countries at ten yearly intervals. It is also possible to derive some information on mobility from special surveys. A good example is the SESTAT (Scientists and Engineers Statistical Data System) system in the United States (Åkerblom, 2001). The disadvantage of these surveys is the lack of international harmonisation. The advantage is that certain targeted policy-relevant questions can be asked, for instance to investigate the mobility of certain types of highly-qualified personnel such as doctors. The OECD has plans to start developing some harmonised core questions on recipients of doctoral degrees, which could be collected by means of special surveys and probably other complementary information, such as data from the register-based system described above.

An inventory of surveys on doctoral recipients carried out in most OECD countries, has been published by the OECD (2003).

5.4 Comparisons of information from registers and LFS concerning total stocks and mobility of human resources using Finnish data

5.4.1 Introduction

In the previous section, various data sources for indicators of knowledge stocks and flows were discussed. In Finland and in the other Nordic countries the same data can be retrieved both from the registers and from the LFS. In this section the differences between

data from these two sources are analysed in order to evaluate how reliable data can be extracted from the LFS, which is available in all EU countries and rather more harmonised internationally. In Subsection 5.4.2 we will discuss indicators of total stocks and in Subsection 5.4.3 indicators of mobility.

5.4.2 Knowledge stocks

This subsection presents the basic results of estimating the Finnish labour force and HRST population using the LFS data and the employment register data. HRST is a concept defined in the OECD/Eurostat Canberra Manual (OECD/Eurostat, 1995) and includes people with completed third level education (ISCED 5 or 6) or in certain occupations (ISCO categories 122, 123, 131, and 2 and 3). Eurostat has subsequently modified the definition so that managers (122, 123, 131) are only included when they have a third level education.

The LFS data concerning the years 1999 and 2000 are from the second quarter of each year. The second quarter was chosen because the question on the previous year's employment is included in this quarter's questionnaire, which is needed for the analysis of mobility flows. The register data is based on the status of the population at the end of the year.

Table 5.1 Labour force according to LFS and register data by industrial sector, 2000

Sector	LFS	Register data	Difference %
ICT sectors*	106,800	106,785	0.0
Agriculture, mining, manufacturing, utilities, construction	759,983	657,794	**15.5**
Trade, transport, communication, other business services	741,634	716,661	3.5
Educational and research institutes	179,280	166,111	7.9
Other community services	573,949	544,987	5.3
Unknown	5,797	36,219	-84.0
Unemployed	294,815	318,104	-7.3
Total	2,662,258	2,546,661	4.5

* NACE 30, 32, 33, 642 and 72.

The total labour force according to the LFS and register data is presented in Table 5.1. In the appendix of this paper more details of the industrial classification used in the register-based system and the LFS can be found. The sample size of the labour force in the LFS was 20,807 and the mean of the weights per person was 128.0, so it represents about a 0.8 percent sample of the labour force. The estimated labour force in the LFS appeared to be 4.5 percent higher than the one according to the register data. The difference was particularly large in the agriculture and manufacturing sectors (16 percent higher in the LFS than in the register), which could be because the LFS includes more self-employed people, especially in agriculture.

The difference may to some extent be due to different time periods of the data sources, so for example more students are included in labour force in the spring LFS than in register data at the end of year. The different time of the year may also be one of the causes of the much lower figure of unemployed workers in the LFS than in the employment register. The comparison may also be influenced by the higher number of employed in the 'unknown' category in the register compared with the LFS. There are also differences in the concepts of 'employed' between the LFS and the registers. The LFS follows the ILO definition of being at work at least one hour during the survey week, while a person is registered as employed in the register only if insured by the employer or registered as employed by the tax authorities. The NACE codes of the statistical units defining the employers may also be different in some cases.

Overall this table does not show very big differences except for the agriculture, mining, and manufacturing sectors. More differences appear when we proceed to a more detailed analysis of HRST.

Table 5.2 HRST employed, LFS 2nd quarter 2000

Occupation	Education			
	University level	Technician level	Other	Total
Production and operation department managers	19,728	7,816	11,379	38,923
Other department managers	30,791	20,048	18,348	69,188
General managers	4,983	11,972	56,231	73,185
Physical, mathematical and engineering science professionals	64,005	16,317	25,043	105,366
Life science and health professionals	39,937	63,172	5,740	108,849
Teaching professionals	81,468	13,716	16,162	111,345
Other professionals	56,482	22,077	42,482	121,042
Physical and engineering science associate professionals	5,529	46,549	44,438	96,516
Life science and health associate professionals	3,866	9,693	99,152	112,711
Teaching associate professionals	24,100	260,00	1,464	1,965
Other associate professionals	18,722	61,207	85,066	164,995
Other occupations	45,045	142,853		187,898
Total	370,797	415,680	405,505	1,191,982

The numbers of employed HRST persons according to the LFS and register data are presented in Tables 5.2 and 5.3. It can be seen that the difference in the employment of HRST employees between the two sources is much greater than between all those employed. The number of HRST employed was 12 percent higher according to the LFS than according to the register data. The difference in HRST defined by the education level (ISCED levels 5B, 5A and 6) was only five percent, about the same as in the total labour force, but the HRST employed defined by occupation produced a 15 percent higher number of HRST employed in the LFS than in the register data. The greatest differences by

occupational definition were found in the categories of general managers (626 percent) and other department managers (105 percent).

Table 5.3 HRST employed, end 2000, Employment register data

Occupation	University level	Technician level	Other	Total
Production and operation department managers	13,649	4,318	4,996	22,963
Other department managers	18,535	8,307	6,995	33,837
General managers	3,346	2,757	3,972	10,075
Physical, mathematical and engineering science professionals	61,841	11,314	13,250	86,405
Life science and health professionals	32,893	58,181	3,142	94,216
Teaching professionals	81,106	14,054	17,037	112,197
Other professionals	60,403	16,913	24,728	102,044
Physical and engineering science associate professionals	13,759	44,882	47,783	106,424
Life science and health associate professionals	4,314	12,390	82,742	99,446
Teaching associate professionals	29	158	957	1,144
Other associate professionals	28,415	73,834	105,097	207,346
Other occupations	41,736	143,317	.	185,053
Total	360,026	390,425	310,699	1,061,150

Still larger differences were found in the subgroups by education and occupation. These results could imply that there exist problems when using LFS estimates of HRST persons, given that the employment register presents the 'more reliable' source in this context. However this is not necessarily the case, for reasons discussed below in more detail. A major discrepancy in the ways in which managers are coded, especially of small businesses, seems to exist between registers and the LFS. For instance, a taxi driver running a business with a few employees is usually coded as a manager in the LFS and as a taxi driver in the register. Analytically the latter interpretation seems more interesting.

Analysis of differences

One reason for these discrepancies is of course that the register represents the total population and the LFS is a sample survey with some inevitable sampling errors. In the estimation procedure up-to-date population totals from registers are used. Post-stratified weights and imputation are used, but not by occupation or qualification, which may cause some additional uncertainty for these variables in estimations. Non-response in the LFS may also vary by educational level, which may cause some additional bias. The Finnish LFS interviews persons, not households. Thus, the quality of occupation data should be better, because proxy respondents are not used as they are in some other countries.

One reason for the much greater differences between LFS and register data in HRST defined by occupation than in HRST defined by education is that source of data for a person's education in both datasets is the same, namely Statistics Finland's register of

completed education and degrees. Thus, there should not be any difference in the data about education; however the data for worker's occupation is produced differently: in the LFS the source of occupational data is the response of the person him/herself, a response which is coded by the interviewer or by specialised coding staff. In the register, different sources are used. For employees the employer usually gives the information. For private sector managers the register data have to be derived from a variety of sources. The data are also produced in different units of Statistics Finland, so there is a possibility of differing interpretations of the occupational classification and of different coding routines.

In Table 5.4 differences in coding (at the one digit level) are analysed using a micro level matching of LFS respondents with register data by occupation.

Table 5.4 Different codes of occupation of employed common in LFS and register data, 2000

Register ISCO	LFS ISCO 1	2	3	4	5	6	7	8	9	0	Un-known	Total
1	.	110	40	8	8	1	3	2	3		2	177
2	245	.	172	50	28	6	22	4	13	3	1	544
3	427	375	.	207	101	13	85	40	41		5	1,294
4	45	93	199	.	30	6	14	24	23		1	435
5	98	37	185	68	.	15	29	27	114	1	2	576
6	25	8	6	7	8	.	11	18	8		1	92
7	100	25	75	20	18	7	.	133	61	1	1	441
8	150	16	60	39	24	15	237	.	103		1	645
9	20	19	49	69	107	13	86	53	.		1	417
0	2	1	4	1	1	1	1	1			1	13
Unknown	51	64	47	29	46	45	51	37	23		.	393
Total	1,163	748	837	498	371	122	539	339	389	5	16	5,027
Total, at work	1,609	3,235	2,660	1,415	1,860	832	2,051	1,469	1,085	88	17	16,321
Difference %	**72.3**	23.1	31.5	35.2	19.9	14.7	26.3	23.1	35.9	5.7	94.1	**30.8**

This table shows that some 31 percent of persons employed according to both data sources have different one digit occupation codes. This is not explained by different reference months of the year of the data sources, as the difference remains the same when the register data is compared to the last quarter LFS data. However, as the LFS occupations are based on the tasks performed, whilst register data use occupational titles, differences in concepts and data collection may explain some of the differences.

The general trend according to Table 5.4 appears to be a shift towards lower skilled occupations in register data compared with the LFS. For example, 72 percent of the employees coded in the LFS into ISCO-88 group 1 (legislators, senior officials and managers) were coded into a different (lower) group in the employment register. In total, there were 1,459 more shifts (excluding unknown cases) into lower level groups from the LFS than there were from register data into lower level groups.

We have made a modest attempt to evaluate which data source is more reliable for the coding of occupations. First, a sub-sample of 120 employed was drawn from the LFS sample. The basis for the analysis was the job descriptions given by the respondents to the

interviewers. At first sight, 97 codes in LFS were regarded as 'right'. These were compared with the register codes. Of these (presumably right) 97 codes, 42 codes were coded the same according to the register. The occupations for 23 persons were coded differently in the register and it was difficult to judge from the description which code was the right one. One coding was regarded as wrong in the register and right in the LFS. In the LFS, 11 codes out of 120 were regarded as mistaken and the register information was regarded as more correct. Many of these cases referred to the problem of managers discussed above. Overly far-reaching conclusions should not be drawn from this exercise about which source is right and which is wrong, but it is a clear indication that the two different sources of information and coding processes give different results in many cases.

5.4.3 Mobility

This subsection illustrates some basic results of estimating mobility rates using the LFS and register data. The mobility rates are given as job-to-job inflow rates, so persons employed at present and the year before are included. Mobility in the LFS data is defined when the respondent declared that the workplace/employer had changed from the previous year. Only the name of the establishment is checked in the interview. In the register data, mobility is defined as a change in the establishment or firm ID code of the workplace from that recorded in the previous year. The ID codes in the register are taken as such; no corrections have been made to take account of missing values or possible artificial organisational changes of firm structures. The firm mobility rates are therefore overestimated by some one percent of units according to earlier research (Virtaharju & Åkerblom, 2003).

Table 5.5 Job-to-job inflow mobility rates of HRST personnel, establishment level in register data, 2000

Sector	LFS			Register data		
	Total	Education	Occupation	Total	Education	Occupation
ICT sectors*	13.0	9.5	13.7	36.2	35.7	36.3
Agriculture, mining, manufacturing, utilities, construction	6.8	7.2	6.1	15.8	16.4	15.9
Trade, transport, communication, other business services	9.5	9.1	10.1	20.5	21.1	19.9
Educational and research institutes	7.1	6.0	6.7	22.4	21.7	22.0
Other community services	8.4	8.4	8.9	23.2	23.6	23.9
Unknown	7.2	10.1	9.7	36.8	36.8	41.9
Total	**8.6**	8.1	8.8	**21.9**	22.3	22.2

* NACE 30, 32, 33, 642, 72

Table 5.5 shows the inflow mobility rates of employees in the HRST total and HRST defined by education and occupation. In general the structures seem to be the same. There is virtually no difference between the two definitions of HRST (which is to be expected

because the groups consist in large part of the same employees). Also the mobility rates by industrial sector appeared to behave similarly both in the LFS and the register data. The highest rates are found in the ICT sectors, a result that has also been confirmed in other studies. However the large differences in level between the mobility rates of LFS and register data shown in Table 5.5 suggest a more profound discrepancy between the two methods of estimation. In every industrial sector except agriculture and manufacturing there is a difference of more than ten percent of units and in the ICT sectors the difference is well over 20 percent of units. Table 5.6 is similar to Table 5.5, but with mobility defined at the firm level.

Table 5.6 Job-to-job inflow mobility rates of HRST personnel, firm level in register data, 2000

Sector	Total	Education	Occupation
ICT sectors	26.9	26.0	26.8
Agriculture, mining, manufacturing (excl. ICT), utilities, construction	13.8	14.6	13.7
Trade, transport, communication, other business services	17.6	18.1	17.1
Educational and research institutes	13.6	12.6	13.4
Other community services	16.4	17.9	16.4
Unknown	36.3	45.6	16.8
Total	**16.9**	17.4	16.8

These mobility rates are lower than the ones calculated using the establishment level (of register data). Nevertheless, the rates calculated using the register are twice as high as those found using the LFS. Figure 5.3 presents the mobility rates of HRST personnel defined only by the education criteria i.e. third level education (HRSTE) and for other employees for 1998-2000. Only education is used here, as occupational data are not available for 1998 and 1999. Figure 5.3 shows that the difference between the mobility rates of LFS and the register data is quite stable over the years. The figure also suggests that according to the LFS there is virtually no difference between the mobility of HRST employees and less educated workers. In the year 2000 the mobility rate of HRST employees was even lower than that for other employees. By contrast, according to the register data there exists a clear trend of higher educated employees being more mobile than others. This figure is an illustration that information from the LFS can give a different message from information derived from the register.

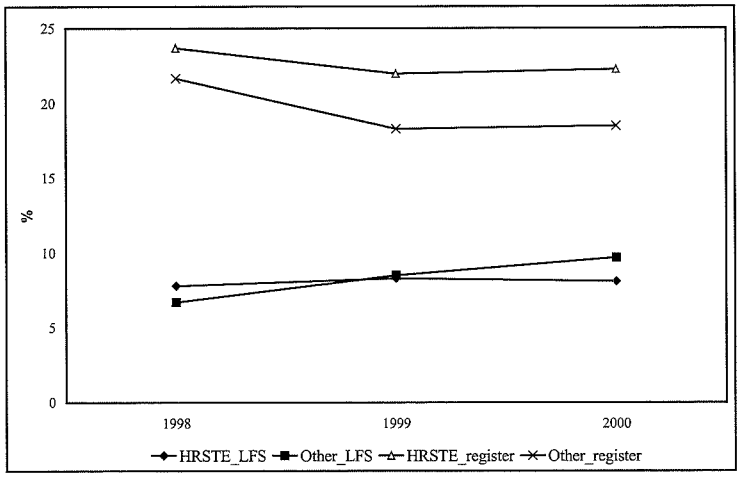

Figure 5.3 Job-to-job inflow mobility rates of HRSTE and other workers according LFS and register data 1998-2000

Analysis of differences

As the major differences in the computed mobility rates between the LFS and register data imply, there must obviously be different information about an individual employee's change of job in these two sources of data for defining mobility. It is hardly probable that the sample in the LFS is so biased towards employees not changing jobs as to provide the whole explanation for these differences. In principle, in both databases the workplace is defined as an establishment and therefore one would assume that an employee's response that job (= establishment) has changed should correspond to the change of establishment (code) in the employment register. Tables 5.7 and 5.8 present employees from both databases and their change of job records. Table 5.7 shows that 14 percent of those who reported in the LFS that their job had not changed were working in a different establishment at the end of the year according to register data. And correspondingly, three percent of employees working in the same establishment according to the register reported a changed employer according to the LFS. The magnitude of the net effect (the possible underestimation of mobility rates in LFS) seems to correspond to the comparison in Table 5.6. The most plausible explanation is that the differences in mobility events between the LFS and registers shown in the tables are overestimated as a result of the different time periods for job changes (spring-spring in the LFS and end year-end year in the registers).

It seems that many mobility events recorded in the register are lost in the LFS. On the other hand some mobility events in the LFS seem not to be related to changes of establishment or firm, which is the intention. Even if the statistical unit in the LFS is in principle the establishment, in practice a change of employer in the LFS usually means a change of firm. There may be difficulties in recalling changes in employment. This could explain at least some of the mobility events according to the register that are missed in the LFS. A greater share of proxy respondents in the LFS could also cause some bias.

Table 5.7 Change of job according to LFS and register data establishment level, 1999 and 2000

LFS	Register data			
	Total	No change	Change of establishment	%
2000				
Same employment	13,593	11,674	**1,919**	14.1
Employment changed	992	**398**	594	59.9
Total	14,585	12,072	2,513	17.2
1999				
Same employment	13,673	11,702	**1,971**	14.4
Employment changed	896	**358**	538	60.0
Total	14,569	12,060	2,509	15.2

Table 5.8 Change of job according to LFS and register data, firm level, 1999 and 2000

LFS	Register data			
	Total	No change	Change of firm	%
2000				
Same employment	13,592	12,068	**1,524**	11.2
Employment change	993	**425**	568	57.3
Total	14,585	12,493	2,092	14.3
1999				
Same employment	13,671	12,310	**1,361**	10.0
Employment change	898	**407**	490	54.7
Total	14,569	12,717	1,852	12.7

Registering changes in employment (changing jobs) within an establishment may be regarded as mobility in the LFS. This could explain some of the mobility events in LFS not recorded as changes of establishments or firm in the register. Artificial changes in establishment or firm numbers and register errors only explain a minor part of the discrepancy.

5.5 Conclusions and final discussion

The analysis above has revealed some unexpectedly big differences between results from the register-based system and the LFS. As the results apply only to Finland their applicability to the LFS in other countries are not self-evident. On the other hand, there is no evidence that these problems do not exist in the LFS of other countries as well.

It is well-known that the coding of occupations according to the ISCO classification is very problematic. According to many national experts the classification is unsatisfactory for a proper coding of occupations. Many countries use their own occupational classifica-

tions and ISCO is used only for international reporting. Statistics Finland primarily uses an older national classification in the LFS but ISCO has been used as a parallel classification in order to facilitate international reporting. Statistics Finland revised the ISCO-based classification in 2001 based on a partially different interpretation of the 1997 version. This is a good illustration of the problems.

The analysis above confirms that two different sources of coding give completely different results in a third of cases. This seems to indicate considerable uncertainty, in addition to sample errors, in deriving occupational breakdowns based on the LFS. In future HRST work, careful consideration should be given to how far the occupational criteria can be used.

The qualification variable in the Finnish LFS is imputed from the register system so this should be of higher quality than the occupation variable, which is collected by interviews. In other countries, if the qualification variable is based on telephone or face-to-face interviews in the LFS and proxy interviews are used more, there is a risk of error in this information as well.

Insofar as mobility analysis from the LFS has been carried out, both nationally and by Eurostat, this is done on the basis of the question on whether there was a different employer the previous year, included as a mandatory question in all surveys. The analysis above indicates that this question in the LFS may not work as expected. It seems only to a limited extent to measure mobility in the sense of either changed establishment or firm, as the intention is. On the contrary, some mobility not involving change of workplace is probably being included. These may be changes of jobs within an establishment. There are reasons to believe that mobility rates based on an analysis of LFS data could be underestimated.

This paper has pointed out some possible weaknesses in the LFS for the purposes of mobility measurement, which might give the impression that all information in the registers, are correct. This is of course not the case. There are always errors in registers. In most cases the significance of the errors could be regarded as small due to the huge volume of information.

Since the 1970s, the Nordic countries have made decisions to promote the use of unified identification numbers for all individuals and organisations and to allow government registers to be linked, which is a precondition for their research use. The investments in constructing the system were of course rather high in the beginning but they have been repaid by considerably reduced costs for surveys and various kinds of population statistics. There are rather small costs for population censuses based on registers. The richness and value of the potential research material is hard to measure in monetary terms. One advantage is that, compared with a situation without registers, the ordinary citizen is much more seldom approached to fill in forms. From the point of view of the Nordic countries a cost benefit analysis of the use of registers to measure mobility is positive. This does not necessarily mean that it is desirable for any specific research area to start building up a complicated register system to acquire information. The objectives should be broader - on the level of information systems for the whole society. There are however some obstacles to such a development in many countries including:

- legislative reasons (linking of registers is not allowed);
- technical reasons (linking of registers is not technically possible due to non-compatible registration routines);
- attitudes of citizens against linking of registers (fears of invasions of privacy);

- high costs for construction of register-based systems (even if the costs will be paid back later in the form of considerably reduced survey costs).

To sum up, the following recommendations emerge from this research:
- harmonisation of occupational coding;
- improvement of ISCO;
- harmonisation of wording of questions in national LFS questionnaires determining the definition of events of mobility.

As the LFS is the only source of mobility information for most European countries, it is still of necessity a crucial resource, but its use should perhaps be on a rather aggregated level as a means of comparing trends. It should be used only with caution to focus on absolute levels and differences. When available, register data should be preferred for more detailed analysis.

Appendix: Classification of sectors, NACE classification

ICT sectors	
Office accounting and computing machinery and electronic equipment	30, 32, 332, 333
Telecommunications	64 (642)
Computer and related activities	72
Agriculture, mining, manufacturing (excl. ICT), utilities, construction	
Agriculture, forestry, fishing	01, 02, 05
Mining, quarrying	10-14
Consumer goods	15-19
Wood, pulp and paper, printing, oil refining, chemical industry, rubber, plastics	20-25
Metals, machinery (not ICT)	27, 28, 29, 31, 331, 334, 335, 34, 35
Other manufacturing n.e.c.	26, 36, 37
Energy and water	40, 41
Construction	45
Trade, hotels, restaurants, transport, communications, financial intermediation, other services (excl. ICT, educational and research institutes)	
Wholesale and retail trade, hotels, restaurants	50, 51, 52, 55
Transport, storage, post, communications	60-63, 641
Financial intermediation	65, 66, 67
Other services	70, 71, 74
Educational and research institutions	
Educational institutions	80
Research institutes	73
Other community services	
Health activities	85
Other community services	75-95 (not 80, 85)

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6 Measuring labour market mobility in the ICT sector

Findings from the EU LFS and the Belgian Datawarehouse

ALEX STIMPSON & MAARTEN TIELENS

Abstract

Using the European Union Labour Force Survey and Belgian administrative data, this paper looks at the possibilities for measuring labour market mobility in the ICT sector. It shows that although the EU LFS offers the means to calculate indicators of mobility in the ICT sector as well as the characteristics of mobile individuals, with such detailed ICT worker profiles, data availability ends up being low. The analyses from the Belgian Datawarehouse illustrate the potential uses of administrative data for mobility research into and around the ICT sector, the main advantage being its exhaustive character, enabling detailed breakdowns of information. For such research topics, the strength of surveys like the LFS more readily resides in the fact that they can obtain qualitative information to complement the quantitative data within administrative databases and that they can provide internationally comparable indicators.

6.1 Introduction

This paper examines certain characteristics of ICT workers and attempts to detail the inflow, outflow and job mobility of workers to, from and within the ICT sector. Two principal sources have been used to do so: the EU LFS and the Belgian Datawarehouse (DWH) Labour Market which contains administrative data. This is the quantitative part of the paper. A quantitative assessment, however, needs to be accompanied by a more qualitative and methodological evaluation, an exercise that was illuminated by a comparison of the two sources, as described later.

6.1.1 Policy context

According to the European Commission's Action Plan for skills and mobility, subsequently adopted at the Barcelona summit in 2002, fostering growth in the European economy calls for better matching between the skills demanded in the growth sectors and regions and those available in the workforce. This requires more mobility of capital and of labour, in pursuit of the twin objectives of a successful and dynamic European economy and a balanced geographical and social distribution of the rewards of faster economic growth.[1]

1 Communication from the Commission to the Council, the European Parliament, the Economic and Social Committee and the Committee of the Regions, *Commission's Action Plan for skills and mobility*, Brussels, 13 February 2002, p. 6.

Such a policy development is to a large extent linked to the ambitious and overriding goal that the European Union set itself at the Lisbon European Council meeting held in March 2000. This goal was 'to become the most competitive and dynamic knowledge-based economy in the world capable of sustainable economic growth with more and better jobs and greater social cohesion' (European Council, 2000).

But measuring mobility in the ICT sector is not only relevant to the Lisbon and Barcelona processes; it is also inextricably linked to the growth and characteristics of employment in the ICT sector and, as such, key European Union policy developments such as the *eEurope Action Plan*.[2]

6.1.2 Objectives

Taking into consideration these areas of interest surrounding the ICT sector, the objective of this paper is to see to what extent the inflows and outflows of ICT workers as well as their destination sectors can be detailed using the EU LFS and the Belgian Datawarehouse. The aim is to gain a better understanding of the knowledge flows in and around the ICT sector as well as the composition and certain characteristics of the ICT sector itself. Results are provided for the European Union (including the New Member States), EFTA and the other Candidate Countries for which data is available. Special focus at a detailed level is placed on ICT mobility in Belgium.

6.2 Measuring mobility in the ICT sector: choices and challenges

One of the key concerns for a European project such as STILE is to provide data, analysis and recommendations that are not just instructive on a stand-alone basis, but can also be viewed in comparison with related research. It is therefore important that the methodology used, the concepts developed and the definitions employed are either rooted in or can be broadly applied to existing international standards and references.

That said, most statistical projects face a dilemma in choosing between what ideally should be measured and what, in reality, can be. And so while every effort has been made to maintain full comparability with international references, in some cases the level of data availability offered by the source means that certain deviations have been necessary.

6.2.1 An introduction to the Datawarehouse and the EU LFS

The Datawarehouse Labour Market is a database in which a series of social data from a number of Belgian social security institutions are permanently linked. The data files of these institutions are related to one another via the (coded and thus anonymous) personal identification number which every person has for their social security (INSZ). On the basis of the information from the participating social security institutions, a detailed division of the population by labour status is drawn up in the Datawarehouse.

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2 Communication from the Commission to the Council, the European Parliament, the Economic and Social Committee and the Committee of the Regions, *eEurope 2005: An information society for all*, Brussels, 28 May 2002.

The EU LFS, on the other hand, is essentially a centralised way of collecting harmonised and comparable LFS data. The main statistical objective of the EU LFS is to divide the population of working age (15 years and above) into three mutually exclusive and exhaustive groups (persons in employment, unemployed persons and inactive persons) and to provide descriptive and explanatory data on each of these categories.

6.2.2 Defining the ICT sector

Information and communication technology provides the basis for measuring the *e*Economy. Though there are a number of different definitions around for ICT, this paper broadly follows that agreed by the OECD Working Party on Indicators for the Information Society. In its publication, *Measuring the ICT sector* (OECD, 2000), the OECD definition of the ICT sector was based on the principle that products in the manufacturing sector:

- must be intended to fulfil the function of information processing and communication including transmission and display;
- must use electronic processing to detect, measure and/or record physical phenomena and communication by electronic means;

and that products in the service sector:

- must be intended to enable the function of information processing and communications by electronic means.

This definition at the very least requires three-digit NACE information.[3] In the context of this paper, LFS data were only available for a minority of countries at the three-digit level of NACE (i.e. NACE 32.1). To ensure comparable data for a maximum number of countries, the starting point therefore had to be two-digit level NACE and, by inference, an inexact measurement of the ICT sector compared to the OECD definition. In adapting the definition slightly, care has been taken not to inflate the definition of ICT, while on the other hand ensuring that the size of the population in the approximation does not increase sampling variation to the extent that it loses its representativeness. For this reason, certain sub-sectors have been excluded compared to the OECD definition.[4] The starting point for the ICT sector using LFS data is detailed in Table 6.1.

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3 NACE is Eurostat's guide to economic activity and stands for statistical classification of economic activities in the European Community.

4 To judge on whether a NACE sector should be included or excluded, an extraction of data was made from Eurostat's Structural Business Statistics database, which has detailed NACE data. The ratio of people employed in the three digit sector(s) compared to the two-digit level was calculated to estimate over/underrepresentation from the inclusion of the two-digit level sector i.e. employment in NACE 33.2 and NACE 33.3 as a share of NACE 33. On this basis, *manufacture of electrical machinery and apparatus n.e.c.* (NACE 31) was excluded from the definition of ICT, as was *wholesale trade and commission trade, except motor vehicles and motorcycles* (NACE 51) and *renting machinery and equipment...* (NACE 71). But while the inclusion of these NACE two-digit sectors would have incorporated non-ICT workers into the ICT cohort, at the same time their omission means that certain individuals have been excluded. To a certain extent, this is 'corrected' by the inclusion of NACE 33 and 64. In NACE 33, the employment share of the ICT sub-sectors generally represents between 40 and 60 percent. *Telecommunications* (NACE 64.2), meanwhile, is very often the most important ICT sub-sector in the economy and its omission would mean both excluding a large number of workers and that any analysis would neglect this very significant facet of the ICT cohort.

Table 6.1 Definition of ICT

NACE Rev. 1.1	Description
30	**Manufacture of office machinery and computers**
30.0	Manufacture of office machinery and computers
32	**Manufacture of radio, television and communication equipment and apparatus**
32.1	Manufacture of electronic valves and tubes and other electronic components
32.2	Manufacture of television and radio transmitters and apparatus for line telephony and line telegraphy
32.3	Manufacture of television and radio receivers, sound or video recording or reproducing apparatus and associated goods
33	**Manufacture of medical, precision and optical instruments, watches and clocks**
33.1	*Manufacture of medical and surgical equipment and orthopaedic appliances*
33.2	Manufacture of instruments and appliances for measuring, checking, testing, navigating and other purposes, except industrial process control equipment
33.3	Manufacture of industrial process control equipment
33.4	*Manufacture of optical instruments, photographic equipment*
33.5	*Manufacture of watches and clocks*
64	**Post and telecommunications**
64.1	*Post and courier activities*
64.2	Telecommunications
72	**Computer and related activities**
72.1	Hardware consultancy
72.2	Software consultancy and supply
72.3	Data processing
72.4	Database activities
72.5	Maintenance and repair of office, accounting and computing machinery
72.6	Other computer related activities

Note: NACE two-digit level in bold text, ICT sectors in plain text, non-ICT but included in ICT based on two-digit NACE codes in italic text.
Source: CAMIRE, Steunpunt WAV, 2003

6.2.3 What are the different ways of calculating mobility?

To calculate mobility using the EU LFS, unless a derived proxy measurement is estimated (i.e. changes in the number of people in the ICT sector from one year to the next as a net inflow/outflow), then it is essential to have data for two different points in time. One way of calculating mobility is by using information from the retrospective questions that are included in the EU LFS questionnaire. The wording of these questions is such that the information can be easily compared with the current year.

Using the Datawarehouse, each individual's socio-economic position and/or employer is known for the end of each quarter in the Datawarehouse. Changes in position or in employer in between two moments can be studied, so quarterly as well as yearly comparisons are possible. The mobility measured can also be crossed with other variables, such as the type of employment (full-time/part-time), or the employer's NACE code.

6.2.4 Measuring knowledge

Knowledge and skills contain various components, including formal education, work experience, but also personality traits like awareness, creativity, analytical thinking or understanding. To that extent, the dissemination of Information Society knowledge should at its widest level incorporate anyone who has been working in the information economy, who can be assumed to carry knowledge about the sector. As a result, the broadest approach to the dissemination of Information Society knowledge includes all workers in the ICT sector, though people with a tertiary education remain an interesting area upon which to focus in more detail.

6.3 The growth and composition of the ICT sector in Europe

Table 6.2 shows the degree of ICT employment-intensity (the proportion of total jobs in the ICT sector) in each European country in 2002.[5] Ireland has by far the highest proportion at 7.6 percent. Other leading countries are Switzerland, Finland, Sweden, the UK and Denmark, all with over 5.5 percent of total employment in the ICT sector. In 2002, Portugal and Cyprus had the lowest level of ICT employment-intensity at 1.7 percent each, just over a third of the average for the EU-25.

Country differences notwithstanding, the ICT sector in Europe can also be characterised by its male dominated nature. On average, only one in three ICT jobs is held by a woman. The most extreme cases of gender inequality can be found in the Netherlands and Greece, where less than one quarter of all people working in the ICT sector are women, although the UK, Belgium and Cyprus are not far off this low. At the other end of the scale, the economies that have the most gender equality in their ICT employment structures are the New Member States. The top seven are Slovakia, Bulgaria, the Czech Republic, Lithuania, Hungary, Latvia and Romania, with proportions of women among total ICT employment ranging between 44 percent and 52 percent. Next, is Portugal, which has the highest ratio of women to men employed in the ICT sector among the EU-15 (40 percent), closely followed by France (38 percent).

But if there are strong country differences between the proportions of men and women working in ICT, there are on average similarities in the distribution of these workers among age cohorts. Although it is unsurprising that ICT workers generally fall into the younger cohorts, in the EU-25, more than one in every three jobs in the ICT sector is carried out by someone in the 25-34 year old age bracket and 70 percent of all ICT jobs are held by people aged between 25 and 44. Again, there are country differences according to gender and age. For example, Romania, Cyprus and Ireland are the most likely to have a high proportion of young ICT workers, with 25-34 year old men accounting for around 50 percent of all male ICT jobs. In Ireland, around six out of every ten jobs held by women in

5 It should be borne in mind that the population on which the analysis for the European perspective is based consists of 25-64 year olds and, when broken down, the main age groups 25-34, 35-44, and 45-64. To avoid frequent repetition, in both the text and the titles to the graphs, the population of employed 25-64 year olds for the European perspective is often referred to as total employment.

the ICT sector were carried out by 25-34 year olds. By contrast with Ireland, female ICT employment is skewed towards 25-34 year olds in Portugal, Spain and Slovenia.

Table 6.2 ICT employment by gender and age, European countries, 2002

	Men				Women					Total	
	25-64	25-34	35-44	45-64	25-64	25-34	35-44	45-64	Among total ICT employed aged 25-64	ICT employment as a % of total employment	Annual average growth rate (1998-2002)
	(1000s)	(%)	(%)	(%)	(1000s)	(%)	(%)	(%)	(%)	(%)	(%)
EU-25	4,775	36	34	30	2,320	36	34	29	33	4.5	2.7
EU-15	4,518	35	34	30	2,074	37	35	29	31	4.6	2.6
BE	135	37	33	30	47	40	35	25	26	5.0	3.9
CZ	85	47	23	30	86	28	30	42	50	4.0	2.2
DK	87	29	31	40	44	34	44	22	33	5.6	3.3
DE	1,054	32	38	30	524	32	37	31	33	4.9	5.2
EE	:u	:u	:u	:u	12	:u	:u	47u	:u	3.1	6.1
EL	55	35	29	35	18	39	34	27	24	2.1	5.8
ES	271	46	30	24	131	54	29	16	33	2.8	3.4
FR	657	36	32	32	398	33	34	33	38	4.9	1.8
IE	70	48	32	21	37	59	26	15	35	7.6	1.9
IT	530	36	33	31	248	40	35	25	32	3.9	3.4
CY	3	51	28u	21u	1u	46u	50u	:u	26	1.7	1.4
LV	10	:u	:u	:u	8	:u	:u	60u	45	2.0	5.8
LT	12	:u	46	:u	12	42	:u	:u	49	1.9	-7.9
LU	4	43	29u	28u	1u	:u	40u	:u	28	3.0	5.3
HU	94	46	26	28	82	39	24	38	46	5.1	7.0
NL	240	36	33	31	75	34	41	25	24	4.7	1.4
AT	117	38	35	27	49	38	36	26	30	5.1	4.4
PL	:	:	:	:	:	:	:	:	:	:	:
PT	43	45	25u	30u	28	58	:u	:u	40	1.7	-0.7
SI	15	44	25u	32u	9u	51u	36u	13u	36	3.0	2.5
SK	34	37	30	33	36	36	36	28	52	3.8	3.7
FI	80	42	29	28	45	38	30	32	36	5.9	0.2
SE	148	35	29	36	75	32	34	34	34	5.9	1.5
UK	1,027	34	36	31	356	35	35	30	26	5.8	2.1
IS	3	39	32	:u	2	:u	:u	:u	33	3.9	1.1
NO	58	40	33	27	27	33	30	37	32	4.3	3.3
CH	132	34	33	33	66	31	38	31	33	6.0	1.3
BG	35	36	24u	41	37	21u	29	50	52	2.8	3.5
RO	79	52	22	26	61	37	36	27	44	1.8	-2.0

EU-25 and EU-15 are estimated.
Exceptions to the reference year 2002: DE, LU = 2001; exceptions to the reference period 1998-2002: DE, LU = 1998-2001; EU-25, CY = 1999-2002; BG = 2000-2002.
:u = data unreliable; u = data should be treated with caution.
Source: EU LFS, spring data (Processing CAMIRE)

In terms of an ageing ICT workforce, Bulgaria and Denmark have the highest proportions of male ICT workers in the 45-64 year old age bracket (41 percent and 40 percent respectively), while for women, Latvia and Bulgaria have the highest proportions of 45-64 year old female ICT workers (60 percent and 50 percent respectively).

In addition to age and gender playing strong roles in the composition of the ICT sector workforce, a frequently suggested phenomenon linked to the growth of an industry focused on information and communication technologies is the breakdown in traditional working conditions. Table 6.3 shows that, far from being a sector that is characterised by job insecurity, the proportion of employees on a temporary contract in the ICT sector in Europe is below the level of the overall economy. Furthermore, over time, the gap has been increasing: the proportion of all employees with temporary contracts was 8.5 percent in 1998, growing to 9.4 percent in 2002. To a certain extent, this rise is explained by the high increase in temporary contracts in Poland, which has paralleled an increasing joblessness (not in table). Over the same period, the proportion of employees on a temporary contract in the ICT sector has fallen from 5.6 percent to 5.3 percent.

If workers in the ICT sector have a greater amount of job security than the average, so too are they more likely to be employed on a full-time basis. At the aggregate level, whilst the proportion of people working part-time has generally increased in Europe between 1998 and 2002, in the ICT sector it has fallen. Though this provides no indication of when the hours are worked (i.e. late, at night or at weekends), it does at least suggest that the ICT sector is more demanding in terms of the number of hours it requires from its workers.

Another pertinent indicator concerns the proportion of people who are self-employed in the ICT sector, how this is changing over time and how it compares with the economy as whole. Change in the proportion of people who are self-employed may be used as an indicator of the degree to which there are increasing or decreasing levels of entrepreneurship. It is a little surprising that the differences between levels of entrepreneurship for the economy overall and for the ICT sector are as wide as they appear to be. At the European level, even though self-employment has increased marginally in the ICT sector between 1998 and 2002 (from 6.8 percent to 7.2 percent) it still remains at less than half of the level evident for the overall economy, which itself has fallen over the same time period to 15.3 percent in 2002.

Table 6.3 Temporary contracts, part-time work and self-employment in the ICT sector and overall, EU-25, 1998 and 2002

	1998					2002				
	Employees		Employment			Employees		Employment		
	1,000s	% of which on temporary contracts	1,000s	% of which working part-time	% of which self-employed	1,000s	% of which on temporary contracts	1,000s	% of which working part-time	% of which self-employed
ICT	5,568	5.6	5,989	9.9	6.8	6,569	5.3	7,095	9.4	7.2
Total	131,339	8.5	159,969	14.8	16.1	139,679	9.4	168,243	15.3	15.3

EU-25 is estimated.
Source: EU LFS, spring data (Processing CAMIRE)

6.4 Inflows, outflows and job mobility in the ICT sector

A basic assumption of this paper is that mobility, on the whole, is positive. But when too much mobility occurs, and depending on the sector of activity, it is worth underlining that this can also be detrimental. For example, where training costs are high and on-the-job learning is long, then too high a mobility rate may imply that employers are not getting the maximum from their employees. Where training costs are lower, skills are easily transferable and employees need less time to get up to speed, then a higher mobility rate will increase the dynamism of the sector. Another important consideration related to mobility is the reason why people are mobile. However, whether mobility is voluntary or not is a key issue that cannot be measured using either the Belgian DWH or the EU LFS.[6]

6.4.1 Flows into and out of the labour market in Belgium

A company's or sector's 'workforce' is, quantitatively speaking, the net result of the inflow and outflow of employees and is therefore not stable. Even a company or an activity sector with an invariable number of employees for years on end is nevertheless influenced by the inward and outward flows of employees. This is what we have termed labour status mobility, referring to a change in socio-economic position/labour status. Employees with their knowledge and skills are an important basic resource of the company. When an employee leaves the company, part of that basic resource is lost, just as new knowledge and skills enter the company when it takes on new employees.

From an analysis of the inflow and outflow movements, it becomes clear that wage-earners in some activity sectors tend to be more mobile than those in others. Table 6.4 gives a total mobility rate on the basis of the total inflow and outflow rates, showing around which ICT sub-sectors most mobility takes place.

Table 6.4 Inflow rate, outflow rate, total mobility rate by ICT sub-sector Belgium, average quarter 2000

NACE	Sector description	Number of employees (n)	Quarterly inflow rate (%)	Quarterly outflow rate (%)	Total quarterly mobility rate (%)
30, 32, 33.2, 33.3	Office accounting and computing machinery	22,330	3.9	3.6	7.5
64.2	Telecommunications	30,811	4.8	3.4	8.2
72	Computer and related activities	36,205	9.6	6.9	16.5
	Total economy	**3,235,914**	**7.0**	**6.4**	**13.4**

Source: KSZ-DWH Labour Market (Processing Steunpunt WAV)

6 A question exists in the EU LFS concerning the main reason for leaving the last job or business, with which it is possible to make some distinction between voluntary and involuntary mobility. However, the question is posed only to those people that are not employed during the reference week of the survey and have not been employed for a maximum of eight years.

Of the total database of 3,235,914 employees (in an average quarter in 2000) in Belgium, 225,507 were mobile between two quarters (inflow into or outflow from a wage-earning job). This gives an overall mobility rate of 13.4 percent.

Looking at the ICT sectors we can see that mobility in both 'office accounting and computing machinery' and 'telecommunications' is below average, while it is above average in 'computer and related activities'. From the high mobility in the 'computer and related activities', we can deduce that Information Society knowledge is very mobile or, in other words, that there is a high flow of knowledge and skills.

Notably, mobility is highest among the young (not in table): 38.3 percent of 15 to 24 year olds and 15.2 percent of the 25 to 34 year olds. Remarkably, the mobility rate of the 15 to 24 year olds in 'computer and related activities' lies below the average (30.0 percent). The above average mobility in this sector is therefore due to high mobility rates for the other age groups, which suggests not only a high likely level of knowledge, but also of experience.

6.4.2 Job-to-job mobility flows by sector in Belgium

Job-to-job mobility is commonly conceived as a change of employer. In the DWH only data about the individual's legal employer (firm) are included; data are lacking about the establishment. Mobility is measured as a change of the relation between an individual's unique ID number and his/her employer's unique ID number, though this misses job-to-job mobility within the same firm e.g. a promotion. Nor is a change of establishment within the firm regarded as job-to-job mobility.[7]

The job-to-job mobility rate reflects the proportion of employees who are working for a different employer one year later. Globally speaking, 7.2 percent of all employees in Belgium moved jobs between 1999 and 2000.

In general, employees in the commercial service sectors (for example 'hotels and restaurants, wholesale and retail') experience greater job-to-job mobility and those in the non-profit making sectors (for example, the 'public sector') are less mobile (not in table). Analyses on the basis of the Belgian LFS have demonstrated that the proportion of involuntary job-to-job mobility is significantly lower in the non-profit making sector than in the commercial service sector. These non-profit making sectors are, among other things, less sensitive to cyclical fluctuations and consequently less liable to bankruptcies and redundancies, forcing fewer people to look for other jobs. Moreover, in the public sector, such as in education, a substantial proportion of employees have the status of a 'civil servant', which implies that they cannot be dismissed.

In the ICT sector, the proportion of job-to-job mobile employees is higher than average: 8.9 percent of employees in the ICT sector worked for a different employer/company in 2000 compared to 1999. Also within the ICT sector notable differences come to the fore

7 When analysing job-to-job mobility we come to another specific problem. An important cause of mobility is entry and exit of enterprises: a significant share of mobility is the result of enterprises going out of business or being restructured in such a way that they change their identification number in the registers, which are used to calculate mobility rates. This ID can change due to administrative and economic reasons (i.e. takeover, split-off, etc.) resulting in 'false' mobility. To a certain degree, this 'false' mobility is corrected for in the Datawarehouse, with transitions of 20 employees or more between two quarters considered a statistical artefact.

such as in 'computer and related activities', which is much more mobile than, for example, the industrial branch of ICT (office accounting and computing machinery). Within 'hardware' and 'software consultancy' (NACE 72.1 and 72.2) respectively 17 percent and 15 percent of employees are job-to-job mobile, which, other than the catch-all 'other computer related activities', makes consultants one of the most job mobile groups of employees.

Table 6.5 Job-to-job mobility rate of employees (15-64 years old) in the ICT sub-sectors, Belgium, 2nd quarter 1999-2000

NACE	Sector description	Total number of employees 2nd quarter 1999 (n)	Job mobility rate (%)
30, 32, 33.2, 33.3	Office accounting and computing machinery and electronic equipment	22,778	4.9
64.2	Telecommunications	26,429	5.7
72	Computer and related activities, of which	27,754	15.3
72.1	Hardware constancy	11,008	17.0
72.2	Software constancy and supply	12,600	15.0
72.3	Data processing	1,815	10.6
72.4	Database activities	818	12.7
72.5	Maintenance and repair of office, accounting and computing machinery	1,432	12.6
72.6	Other computer related activities	81	29.6
Total ICT sector (3-digit level)		**76,961**	**8.9**
Total economy		**2,778,338**	**7.2**

Source: KSZ-DWH Labour Market (Processing Steunpunt WAV)

An interesting question is where all those job changing employees with their knowledge and skills go to. Do they remain within the same sector or do they move to a related rather than completely different sector? Inversely, we can also ask where all the 'new' employees in a sector come from. To indicate such phenomena, employees who moved to a different employer between two quarters in 2000 can be examined.[8] So too can the movement between sectors.[9]

Overall in Belgium 293,700 employees moved to a different employer between two quarters over the specified period.[10] Of those, 50 percent remained employed within their own aggregate sector. In general, the proportion of 'stayers' is higher in the commercial

8 Sum of the people who were job-to-job mobile between the fourth quarter of 1999 and the first quarter of 2000; between the first and second quarter of 2000; between the second and third quarter of 2000; between the third and fourth quarter of 2000. Each time, the data refer to the last day of the quarter.

9 Only the inflow and outflow from other sectors are considered, not from other labour market states such as unemployment.

10 Employees who changed jobs twice (or more) during the year are counted twice (or more), except if the changes took place within one quarter.

and non-commercial service sectors and lower in the industrial sectors, with the exception of the construction sector (not in table). An important observation is that the proportion of 'stayers' in the ICT sectors remains far below the average. Employees in ICT who move to a different employer leave their own sector more often than average: 41 percent stay in 'computer and related activities', 25 percent stay in 'telecommunications' and only 11 percent stay in 'office accounting and computing machinery'. In the ICT sector, therefore, intra-sectoral mobility is lower or, in other words, the outflows are higher. What the data cannot indicate is the reason for this lower level of intra-sectoral mobility. It could just as easily be evidence of greater transferability of skills as an indication of the attractiveness of the sector in terms of wage levels, hours worked or type of contract provided. The DWH can only provide quantitative information.

Table 6.6 Outflow from ICT sector to sector of destination, percentage, Belgium, average 2000

Quarter t	Quarter t+1				
	Office accounting and computing machinery and electronic equipment	Telecom-munications	Computer and related activities	Other	Total
Office accounting and computing machinery and electronic equipment	11.4	7.9	12.0	68.7	100.0
Telecommunications	1.5	25.0	13.8	59.7	100.0
Computer and related activities	1.8	5.7	41.3	51.2	100.0
Other	9.2	15.7	32.5	42.6	100.0

Source: KSZ-DWH Labour Market (Processing Steunpunt WAV)

Limitations of space mean a detailed sector breakdown cannot be presented, but with regard to the flow between sectors, it can be seen that the ICT sector has a particular 'trade-off' relationship with the 'wholesale of machinery, equipment and supplies' (NACE 51.6), with 'business and management consultancy activities' (NACE 74.1) and 'architectural and engineering activities and related technical consultancy' (NACE 74.2). Furthermore, the industrial branch of ICT also finds 'receivers' and 'suppliers' in the 'manufacture of machinery and equipment' (NACE 29) and the 'manufacture of electrical machinery and apparatus' (NACE 31). For 'telecommunications', the main moves involve the 'miscellaneous business activities' (NACE 74.8) and the 'administration of the state and the economic and social policy of the community' (NACE 75.1) sectors.

6.4.3 Mobility flows in Europe

Using the EU LFS, one of the first observations to make when looking at mobility in the ICT sector by gender is that the availability of data is very low. This can be due to an absence of the necessary variables to calculate mobility (i.e. working status in the previous year or length of time with the current employer) or that the sample becomes too small to meet each country's reliability requirements. In 2002, data for more than ten countries had to be suppressed in order to conform to the publication guidelines drawn up by the

countries. Furthermore, in some of the other smaller countries, the data need to be treated with caution. In fact other than the larger countries (Germany, Spain, France, Italy and the UK), only the Czech Republic has fewer problems with data breaching the reliability limits. Total mobility is not affected to the same extent. Here the question does not concern meeting the reliability thresholds for the data so much as whether the necessary variables to calculate mobility are reported (Ireland and Austria).

Table 6.7 Job-to-job mobility by gender in the ICT sector and overall, percentage, European countries 1998 and 2002

	ICT sector				Total			
	Women		Men		Women		Men	
	1998	2002	1998	2002	1998	2002	1998	2002
BE	11.4u	8.8u	10.3	8.6	6.6	6.6	6.8	7.0
CZ	5.3	5.9	8.0	8.1	6.8	6.4	7.7	6.2
DK	:u	:u	11.7	12.1	11.3	10.4	11.4	12.4
DE	6.6	:	7.1	:	6.2	:	6.7	:
EE	:u	:u	:u	:u	9.4	7.5	13.5	11.1
GR	:u	:u	:u	:u	4.5	5.0	4.4	4.9
ES	5.2u	5.2	6.7	7.5	8.0	9.3	8.8	8.9
FR	5.7	6.4	6.3	8.5	5.4	7.4	6.7	8.2
IE	:	:	:	:	:	:	:	:
IT	4.7	:	3.8	:	4.6	:	4.2	:
CY	:	:u	:	:u	:	7.5	:	9.4
LV	:	:u	:	:u	:	8.9	:	10.8
LT	:	:u	:	:u	:	7.0	:	12.0
LU	:u	:	:u	:	4.8	:	4.1	:
HU	5.7u	6.7	9.1	3.4u	5.5	4.6	7.9	5.6
NL	9.9u	:	11.5	:	8.6	:	7.7	:
AT	:	:	:	:	:	:	:	:
PL	:	:	:	:	3.3	3.6	6.1	5.3
PT	:u	:u	:u	:u	7.6	5.6	8.5	7.8
SI	:	:u	:	:u	:	4.9	:	4.8
SK	:	:u	:	:u	:	2.5	:	3.9
FI	12.7	8.7u	6.9u	7.4	9.9	10.3	8.7	9.8
SE	9.9	:u	11.2	:u	5.6	4.7	6.9	4.8
UK	15.9	10.2	13.9	11.2	11.1	11.4	11.5	11.5
IS	:u	:u	:u	:u	13.4	13.0	13.5	13.1
NO	:u	:u	19.4	:u	8.6	6.2	10.3	6.1
CH	6.8u	12.6u	8.8	8.9	9.3	11.3	8.7	8.8
BG	:	:	:	:	:	:	:	:
RO	:	:u	:	:u	:	4.8	:	7.7

EU-25 is estimated; exception to the reference year 1998: ES = 1999; exceptions to the reference year 2002: DE, LU = 2001.
: = not available; :u = data unreliable; u = data should be treated with caution.
Source: EU LFS, spring data (Processing CAMIRE)

This inadequate data availability for the ICT sector, without even taking into consideration the values for which caution should be exercised, serves to negate one of the principal advantages of the EU LFS: that it is able to provide reasonably harmonised data for a large number of countries for international comparison.

6.5 Methodology and quality issues

This section investigates in greater detail the methodological and quality issues linked to measuring mobility in the ICT sector, essentially asking the question: how good a source is either the EU LFS or the DWH for measuring ICT sector mobility? To do so, it first looks at the advantages and limitations of the LFS, before carrying out the same exercise for the DWH. The third section summarises the conclusions of a comparison of the LFS data with that of the DWH.

6.5.1 Using the EU LFS to measure ICT sector mobility

There are a number of factors that need to be taken into consideration for assessing the degree to which the EU LFS is a suitable source for measuring ICT sector mobility. Apart from some general issues, the main criteria need to be first its accuracy in measuring ICT and second its suitability for measuring the dynamics of employment change.

Surveys such as the LFS have many advantages. The LFS is addressed to anyone, regardless of their professional status; the self-employed as well as wage earners; those in jobs as well as the unemployed; children as well as those on bridging pensions schemes are all included. This means that the resulting statistics are far-reaching. Because the survey is co-ordinated by Eurostat, comparisons can be drawn within Europe, and, to the extent that data are available, homogeneous time sequences can be developed because the LFS is repeated on an annual (and, since 2002, continuous) basis. Furthermore, the information is relatively up-to-date, and biographical variables like age and level of education are also included. Surveys may also be useful for obtaining more qualitative information. For instance, for the unemployed (though unfortunately not for the whole population) it is possible to request information concerning the voluntary or involuntary nature of mobility through the LFS survey. Are people moving of their own free will or were they dismissed? This sort of information is not available from administrative databases.

Surveys also have obvious disadvantages. For example, the results need to be interpreted within a certain confidence interval because only a small proportion of the total population is used to formulate general statements about the population as a whole. Apart from these 'sampling errors', other errors disconnected from the sample exist, for instance because questions were misunderstood, the interviewer wrongly coded or misunderstood the response, etc.

There are also some specific problems related to measuring the ICT sector using the EU LFS. As already underlined, the OECD definition of ICT requires data at the NACE three-digit level, and sometimes even at the four-digit level, while the number of countries that send data at the NACE three-digit level to Eurostat is limited. In effect, this shortage of comparable detailed data according to the sector of economic activity has been the principal reason for the development of a *proxy* ICT sector at the division level (two digit) of the NACE nomenclature. This definition of ICT inflates levels of employment (to a degree

which differs between countries) beyond those given by a closer adherence to the principles of the OECD definition.

Using LFS data also carries certain disadvantages specific to the way in which mobility is measured. Measuring mobility using data available from retrospective questioning relies on information being provided after the actual event. Retrospective questioning can induce recall bias of both a random and a systematic nature. There are a variety of different factors that have been shown to have an effect on recall accuracy. These include the length of the recall period, the complexity of the reporting task, and the saliency, pleasantness and social desirability of the events being recalled (Paull, 2002). Further studies have indicated that the young are more likely to recall events accurately than the old, men are more likely to recall events correctly than women and the educated show a higher propensity to recall events precisely than individuals with lower educational attainment (Smith & Thomas, 2003). The accuracy of recalled events can also be influenced by the nature of the event itself. For example, spells of unemployment are less likely to be recalled correctly than spells of employment and shorter spells of any sort are less likely to be recalled correctly than longer spells (Paull, 2002). Research has also shown that the effect of memory distortion is mainly one-way, namely in the direction of an underestimation of mobility flows (Allaart & van Ours, 2001).

Another specific problem for the LFS is that it often works with proxy respondents, which may affect the reliability of the data: in order to reduce non-response, a member of the household is allowed to answer questions on behalf of the absent respondent. Statistics Canada has found that the information on the labour market situation (whether someone is employed, unemployed or not professionally active) and about personal characteristics tends to be good quality, even when provided by proxy response. Other, more specific information on the family member, on the other hand, may be less accurate, e.g. the usual number of hours worked or the description of the activity sector (Statistics Canada, 2003).

Apart from these problems affecting the quality of the results, though the EU LFS is a relatively harmonised source of data, its list of questions is provided only as a guideline to the Member States. In practice this means that the questions may not be formulated in exactly the same way in each country, which can lead to differing results.

6.5.2 Using the DWH to measure ICT sector mobility

A number of disadvantages inherent in the LFS can be avoided by using an administrative database like the DWH. The exhaustive character of this data source prevents the need for the results to be extrapolated, and no interval needs to be observed for the sake of reliability. Overall, this source can be recommended, particularly for relatively small populations. This makes it suitable for the analysis of mobility between various sectors of activity, for instance.

Furthermore, this type of data source is not affected by memory distortion or by the problem of proxy respondents and more variables can be taken into account (e.g. work regime). On the other hand, a number of factors cause administrative databases to overestimate trends (unless a few careful corrections are made). Firstly, register data is inevitably contaminated, because variations are not incorporated on time or are corrected at a later date. This administrative delay affects the analysis of socio-economic mobility on a

quarterly basis. Secondly, they contain many inaccurate transitions, for instance, apparent transitions from one employer to another only because the employer's registration number in the database has changed. Mergers, workers becoming self-employed or departments that become detached from parent firms, as well as purely legal changes such as the status of the firm or a different company name can all lead to transitions which the employees themselves do not experience as job changes, and will not be reported as such (Allaart & van Ours, 2001). To a certain degree, this 'false' mobility is corrected for in the DWH (see Section 6.4.2).

The fact that a change of jobs is in fact counted as a change of legal employer is another problem inherent to the DWH. It means that information is not available at the level of the local establishment, but only at the level of the legal employer i.e. the firm (the Belgian LFS, on the other hand, measures the local establishment level). In the DWH, a change of establishment within the same firm is therefore not classified as mobility. The DWH is also unable to measure internal mobility (for example, through promotion) within an establishment or firm. Another major problem when studying, for example, mobility of know-how and knowledge, is the lack of data on educational attainment in the DWH.

Generally speaking, a lot of information is already registered. This is, moreover, a process that is on the increase. But most register data are collected for administrative purposes, not for research. On the other hand, there is a growing awareness of the usability of register data for research as well as for policy monitoring and, as part of this process, efforts are being made in Belgium to improve the usability of the register data for research/policy. An example of this would be the introduction of a unique ID number for establishments and the growing willingness in Belgium to link more databases to the DWH.

6.5.3 Confronting the LFS with the DWH

When analysing data about labour market phenomena, it is important to obtain some indication of the quality and reliability of the data used. By confronting both sources, we can learn something about the reliability and quality of each source. As is shown in Table 6.8, globally speaking, the LFS contains 6.3 percent more wage-earners than the DWH. This is partly because the DWH excludes employees such as outbound frontier workers and unpaid helpers (of the self-employed) as well as moonlighters.

Table 6.8 Number of employees by activity sector according to LFS and DWH, Belgium, 2000

Sector	LFS (n)	DWH (n)	Difference (n)	Difference (%)
ICT	**169,645**	**142,512**	**27,133**	**19.0**
Office accounting and computing machinery and electronic equipment	33,459	26,129	7,330	28.1
Telecommunications	88,935	80,179	8,757	10.9
Computer and related activities	47,251	36,205	11,046	30.5

Table 6.8 Number of employees by activity sector according to LFS and DWH, Belgium, 2000. Continued

Sector	LFS (n)	DWH (n)	Difference (n)	Difference (%)
Agriculture, mining, manufacturing, utilities, construction	**952,316**	**812,541**	**139,775**	**17.2**
Agriculture, forestry, fishing	16,987	22,328	-5,341	-23.9
Mining, quarrying	7,451	4,003	3,448	86.2
Consumer goods	152,259	136,074	16,185	11.9
Wood, pulp and paper, printing, oil refining, chemical industry, rubber, plastics	197,822	156,781	41,041	26.2
Metals, machinery (not ICT)	277,831	229,454	48,377	21.1
Other manufacturing	69,150	57,640	11,510	20.0
Energy and water	34,214	26,595	7,619	28.6
Construction	196,603	179,667	16,936	9.4
Trade, hotels, restaurants, transport, communication, financial intermediation, other services (excl ICT, educational and research institutes)	**1,018,457**	**1,085,155**	**-66,698**	**-6.1**
Wholesale and retail trade, hotels, restaurants	453,143	509,646	-56,502	-11.1
Transport, storage, post, communications	211,865	170,600	41,265	24.2
Financial intermediation	147,430	128,274	19,156	14.9
Other services	206,018	276,635	-70,617	-25.5
Educational and research institutes	**355,487**	**323,612**	**31,875**	**9.8**
Universities, educational institutions	344,702	313,199	31,503	10.1
Research institutes	10,786	10,413	373	3.6
Other community services	**920,085**	**850,919**	**69,166**	**8.1**
Health activities	404,657	321,466	83,191	25.9
Other community services	515,428	529,452	-14,024	-2.6
Extraterritorial organisations	24,302	3,141	21,161	673.6
Unknown	104	18,035	-17,931	-99.4
Total economy	**3,440,395**	**3,235,914**	**204,481**	**6.3**

Source: NIS LFS, KSZ-DWH Labour Market (Processing Steunpunt WAV)

At the sector of activity level, however, the deviations between the LFS and the DWH are larger. Even if we only look at the large sector aggregates (indicated in bold in the table), we see that the differences are significant. At a more detailed level, the differences are even more striking. The only thing we can conclude from this is that the two sources draw very different pictures of the distribution of wage-earners and that we are actually talking about two different 'realities': the administrative reality and the subjective reality.

The differences between these sources with regard to the flows between jobs (16.1 percent) exceed those of the stocks (6.3 percent), but overall, these differences are not particularly dramatic. According to the LFS, approximately 235,800 people changed jobs in the year to 2000, compared to a total of around 203,100 according to the DWH (Table 6.9). In any case, both sources indicate a similar order of magnitude, both for stocks and for flows. As far as the age distribution is concerned, there are important differences. In the case of 25 to 34 year olds, the difference with respect to the flows is as much as 25 percent, whereas it amounts to 17 percent for 35 to 44 year olds. A possible explanation is the fact that the DWH does not measure internal mobility within the firm whereas the

LFS, following the approach taken in this report, measures a change of function/position as mobility. It may well be that this internal mobility is more prevalent in the age groups 25-34 and 35-44, for example through promotion or by people still looking out for the right job within the company.

Table 6.9 Job-to-job mobile employees and job mobility rate by gender and age according to LFS and DWH, Belgium; annual average 2000

	Job-to-job mobile employees				Job-to-job mobility rate		
	LFS 2000 (n)	DWH 2000 (n)	Difference (n)	(%)	LFS 2000 (%)	DWH 2000 (%)	Difference (%)
Men	140,500	121,049	19,400	16.0	7.2	6.6	9.1
Women	95,300	82,040	13,300	16.2	6.4	5.9	9.3
15-24 year	47,100	46,474	600	1.4	13.8	12.4	11.5
25-34 year	110,500	88,289	22,200	25.2	10.6	9.3	13.3
35-44 year	54,700	47,165	7,600	16.0	5.1	4.8	6.1
45-64 year	23,400	21,161	2,300	10.7	2.4	2.3	5.3
Total	**235,800**	**203,089**	**32,700**	**16.1**	**6.9**	**6.3**	**9.2**

Source: NIS LFS, KSZ-DWH Labour Market (Processing Steunpunt WAV)

From these analyses, we can conclude that the differences between the LFS and the DWH in relation to the *stocks* and *job-to-job mobility flows* generally remain fairly limited. But when we make a distribution by activity sector, the differences mount up. It seems as if the variable 'activity sector' reflects a different reality in each source and furthermore that the quality of this variable in the LFS is dubious, particularly for certain groups like young people, where many proxy respondents are used.

6.6 Conclusion

The conclusions of this paper are relevant at a number of levels. The first, the statistical results, concerning stocks of ICT workers in the EU and detailed stocks and flows in Belgium, can provide useful information to help judge the progress that is being made towards key EU policy objectives including those of the Lisbon and Barcelona summits. The second relates to the quality of the results obtained, most notably for mobility flows (in the ICT sector) using the EU LFS data.

The importance of research into mobility in the labour market has sharply increased over the last few years and many researchers have homed in on the issue. The most important source for studying mobility in the labour market has been the LFS. In Belgium as in other countries, mobility research has been based mainly on the information available in the LFS. Recently, the DWH has become an important new source at the disposal of researchers. Experience in the Scandinavian countries has demonstrated that administrative databases have considerably widened the scope for labour market research. More and more countries, including Belgium and Germany, have opened up their administra-

tive databases for research, with an increasing awareness that they provide significant opportunities.

In the context of this paper, we wanted to explore the possibilities offered by this new database to assess the current and future value of the LFS and of administrative data for research into mobility in the labour market. More specifically, we tried to gauge the value of both sources for research into the mobility of employees in the ICT sector in order to gain a better insight into the knowledge flows into and around the ICT sector as well as of the distribution of Information Society knowledge.

It is evident that whilst, in theory, the EU LFS offers the means to calculate indicators not just on mobility in the ICT sector, but also on the characteristics of the individuals who are mobile, the practical application of these methods often gives unsatisfactory results. Though better when mobility is measured for the total economy, when the ICT sector is differentiated, data availability is low.

The availability of indicators is strongly affected by the numbers of people who fall into the selected category. This has an important bearing on the interpretation of the results and the degree to which the EU LFS can and should be used as a data source for such detailed ICT worker profiles. It is also worth underlining that this quality consideration is not only dependent on the make-up of the ICT sector by country, but also on the capacity of the LFS to capture the information: fewer problems are encountered where the ICT sector is more pervasive and where national LFS samples are larger. Further analyses have also underlined other issues related to the measurement of mobility in general, for example the use of retrospective questioning and of proxy respondents.

One of the main advantages of using the EU LFS as a source is that it provides relatively harmonised and internationally comparable data. This could offset to some extent the misgivings that result from the relatively broad definition of ICT that has been adopted, itself so that a greater number of countries could be analysed. However, when such widespread suppression of data becomes necessary as with the indicators on mobility in the ICT sector, one has to question the value of using the EU LFS for the purposes of providing a comprehensive picture of mobility in the ICT sector in the European Union.

The first analyses from the Belgian DWH, on the other hand, have clearly illustrated the possibilities but also the limitations of administrative data for mobility research in general and, more specifically, for research into knowledge flows into and around the ICT sector. The main advantage of the DWH is its exhaustive character which requires no extrapolation, enabling a far-reaching breakdown of variables. This is particularly crucial for a detailed demarcation of the ICT sector.

In future, the importance of administrative data can only grow, not only because public authorities are increasingly recording information digitally but also because a growing amount of information is recorded with regard to the labour market and education. It is clear that it is difficult to surpass the possibilities that administrative databases offer for quantitative analysis. Then again, the strength of surveys like the LFS resides in the fact that they can obtain more qualitative information that can complement the quantitative information contained within administrative databases. Qualitative data form the indispensable motor of explanatory labour market research. Within the framework of a SWOT analysis (an analysis of strengths, weaknesses, opportunities and threats), this is an opportunity for the LFS. In the context of this paper, a case in point is the cause of mobility. The analysis of outflows from ICT sectors in Belgium revealed varying degrees of intra-sectoral mobility, raising questions about the transferability of skills and the attrac-

tiveness of the sector. These are questions that cannot currently be answered, but which, with slight modification to the coverage and the wording of the responses in the LFS, could be. Moreover, they are of crucial importance for research into the causes of mobility. For research questions like those addressed in this paper, the future of surveys like the LFS therefore lies in the collection of qualitative information, ideally linked to the administrative databases (and anonymised) to contribute to the development of a comprehensive research instrument.

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7 Measuring potential offshoring of ICT intensive using occupations[1]

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Abstract

The paper looks at where ICT skills, at different levels of complexity, are found in the economy. It takes a new approach by identifying and characterising industrial sectors according to their share of ICT-skilled employment, on the basis of both a narrow ICT skills definition (IT specialists only) and a broad definition (IT specialist skills, but also basic and advanced ICT user skills). In addition, it identifies ICT-using industries by examining the degree of actual usage of ICTs rather than investment in ICTs. The analysis covers Europe, the US, Japan, Korea and Australia. The ratio of ICT-skilled employment to total employment at industry level shows that certain services sectors (computer and data processing services, financial services, insurance) and certain manufacturing sectors (office equipment and computers, precision instruments, electronic equipment) tend to have a high share of ICT-skilled employment in total employment. Wholesaling also tends to have a relatively high ratio of ICT-skilled employment to total employment, while retailing does not, except in certain retail sectors in the US. Finally, the ICT-skilled employment measure is combined with productivity data to evaluate sector performance in Europe. Results suggest that a high share of ICT-skilled employment in total employment is associated with a high level of value added per employee at industry level.

7.1 Introduction

Despite widespread media attention to international outsourcing and offshoring, little hard evidence of the extent of this phenomenon exists. Chapters 2 and 6 of the *2004 OECD Information Technology Outlook* take a closer look at what can be said about the international sourcing of IT and ICT-enabled services (often referred to as 'offshoring'). This includes international insourcing, to foreign affiliates, and international outsourcing where activities are contracted out to independent parties in other countries.

The current media focus is on the offshoring of jobs, but in- and outsourcing can also take place domestically, and domestic outsourcing is still very much larger than international outsourcing. Furthermore, offshoring and outsourcing have existed for many years in the manufacturing sector but are now increasingly taking place in the services sector as a result of increased tradability of services, resulting from trade liberalisation and rapid technological developments, especially in ICTs, and the ability to codify and standardise routine ICT services tasks. As a result, the production of many services activi-

1 This article summarises the analytical approach to measuring potential offshoring of ICT intensive using occupations. As this work is completed it is posted on the OECD website at http://www.oecd.org/sti/information-economy.

ties becomes increasingly location-independent. The main firm-level drivers are increased competition and the ensuing need to achieve efficiency gains and cut costs, as well as skill shortages.

To date, most evidence of offshoring is anecdotal and there are no official statistics measuring the extent of the offshoring phenomenon. This is complicated by important definitional and measurement problems. In the absence of official statistics on offshoring, it is necessary to look at indirect measures, such as trade in services and employment data. However, even the official indirect statistics are difficult to interpret and in many cases imperfect.

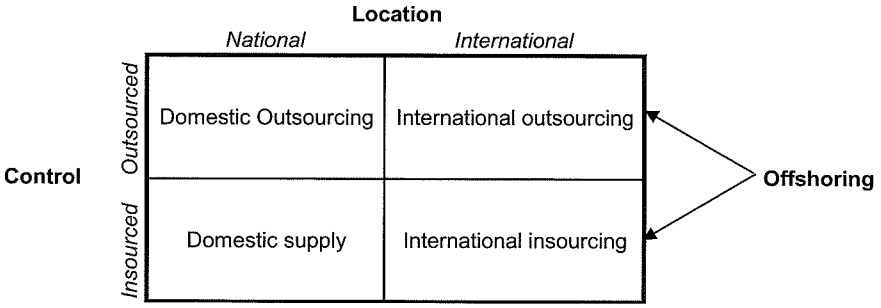
This paper summarises recent research (undertaken in the Information, Computer and Communications Policy Division of the OECD - Directorate for Science, Technology and Industry) that contributes to clarifying the debate. In Section 7.2 the offshoring phenomenon is described and illustrated. Section 7.3 examines what can be learned from trade data. Section 7.4 presents initial results from the analysis of employment data as well as the way in which these data will be further exploited in ongoing work. Section 7.5 concludes.

7.2 Offshoring, or international sourcing, of IT and ICT-enabled services

Offshoring – the international sourcing of IT and ICT-enabled business support services such as customer services, back-office services and professional services – is a recent development in the globalisation of the ICT sector. It has arisen in response to the need to cut costs and fill skills shortages, and competition has created a self-reinforcing dynamic. Once one or two firms had shifted to lower-cost locations and moved the cost/quality frontier, others had to follow. How long the dynamic will be maintained will depend on the availability of skills and relative wage and other costs. As activities are being moved offshore, relative wages will adjust and slow down the offshoring process. The extent to which activities can be moved offshore will also depend on the supply of skilled labour overseas, as well as the potential for undertaking service activities at a distance.

In a context of globalisation, market deregulation and rapid technological developments, firms increasingly resort to new organisational forms in order to meet competitive pressures. Firms can reorganise through mergers and acquisitions, joint ventures and strategic alliances, but also by outsourcing internal activities to external suppliers (see Pain & van Welsum, 2003, for example). By concentrating on their core comparative advantages and outsourcing other activities, firms may increase their competitiveness through cuts in labour and capital investment costs and the exploitation of economies of scale. Outsourcing may also lead to more efficient organisation of firms and allow them to share and spread risk. Furthermore, rapid developments in ICTs provide increasing opportunities for outsourcing. In particular, 'knowledge work' such as data entry and information processing services and research and consultancy services can easily be carried out via the Internet and email, as well as tele- and videoconferencing (ICT-enabled services). Increasingly, activities such as call centres have also started to be offshored. For example, when phoning to a call centre on a local telephone number in the UK, the person answering may well be located in Bangalore.

Services offshoring is a recent development in the globalisation of the ICT sector and involves both international outsourcing (giving rise to unaffiliated trade in services) and international sourcing from foreign affiliates (giving rise to Foreign Direct Investment and affiliated trade in services). It is useful to define the nature and scope of offshoring, or international sourcing, in terms of a matrix of location and control (Figure 7.1). Within such a framework, services can be supplied internally (i.e. insourced) or by an external supplier (i.e. outsourced), and they can be supplied from within the country (nationally) or from another country (internationally).



Source: OECD

Figure 7.1 Offshoring, outsourcing and insourcing - an illustration

Manufacturers have sourced components from other countries for many years, but the international sourcing of business support services, and ICT-enabled services more generally, is a relatively recent phenomenon. It has been enabled by rapid developments in IT systems and broadband communications and by the liberalisation of trade in services, which are making services more easily tradable. As a result, service activities are now less constrained in their choice of location than they have been traditionally. As services account for a large share of production costs, there is increasing pressure to seek lower-cost solutions for the provision of business process services. Offshoring is one response to these ongoing cost pressures and to the ICT and related skills shortages experienced in many developed countries during the late 1990s.

7.3 Measuring the extent of offshoring: what do the trade data tell us?

There are many challenges involved in tracking offshoring activities, because of definitional and data collection difficulties and because there are a number of modes of offshoring. For example, if international sourcing implicitly refers to activities that were previously carried out in the home country and within the firm (in the case of outsourcing), this raises the question of 'when outsourcing stops being outsourcing', i.e. when does it become just another intermediate purchase? As a result, there are no official data measuring the extent of the offshoring and outsourcing phenomena directly. Trade in services provides one possibly proxy, but other possibilities include employment data or input-output tables.

One way to examine the extent of offshoring using trade data would be to look at countries' imports of services. If a country sources services activities internationally, this should result in a return flow of imports of services. One study testing this proposition empirically is van Welsum (2004) who finds a clear effect of production relocation in the services sector on US imports of services. Another way is to look at exports of services, especially of countries that host international sourcing activities.

Offshoring of services activities should result in a return flow of exports of services from the country receiving the international sourcing. For example, Indian exports of ICT-enabled services have grown rapidly since the mid-1990s. The extent of international trade in IT and ICT-enabled business process services in international statistics is approximated by summing the IMF Balance of Payments categories 'computer and information services' and 'other business services'. These data contain information on international outsourcing and international insourcing combined (see also van Welsum, 2004). However, data on computer and information services are not available for all countries. For some, such as India, they are included under 'other business services', along with other services.[2] The 'other business services' category may have variable shares of IT and ICT-enabled services in different countries. Moreover, the data are reported in current US dollars and will be affected by currency movements.

Most exports of other business services and computer and information services still originate in OECD countries although their share declined by 2.4 percentage points between 1995 and 2002 (from 79.5 percent of total reported value shares in 1995 to 77.1 percent in 2002).[3] Figure 7.2 shows the 15 countries that accounted for the largest value shares in 2002, as well as some selected other economies. OECD countries have the top five shares of these services exports with India in sixth position. Nevertheless, some non-member developing economies are experiencing rapid growth in exports, although most are starting from very low levels (Figure 7.3). Only India and Ireland are among the ten countries with the largest shares and the fastest growth rates.

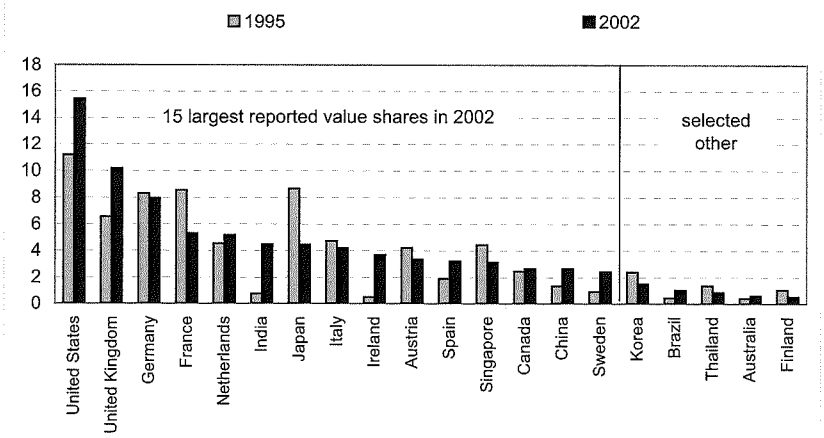
Exports of other business services and computer and information services are sensitive to the overall business cycle. The global downturn affected total reported values (in current US dollars) of exports, with annual growth rates averaging 6.9 percent over the period 1995-2000, and 3.9 percent for 2000-2002. For some countries, the difference was more marked. India, for example, experienced very strong average growth of its exports over the period 1995-2000 with a compound annual growth rate (CAGR) of 43.8 percent, which slowed to 19.6 percent for 2000-2002.

It remains, however, difficult to interpret these data. It is not possible to tell what share of these exports results from international sourcing activities. Offshoring can include unaffiliated trade in services (from international outsourcing), affiliated trade (from inter-

2 For India, the category 'other business services' includes all services except travel, transport and government services. However, Indian firms are now extensively exporting ICT-enabled services and business process services and the remaining services included in the category are likely to be small in comparison. Furthermore, data on overseas revenues from annual reports of top Indian export firms show patterns similar to the IMF data.

3 However the share of some services exporting countries may be understated as they may not have very good data on trade in services to report to the IMF, which will bias their actual share downwards. Furthermore, other countries that export services may not be members and report to the IMF.

national insourcing) and also temporary migration, Mode 4 trade in services under the GATS. But temporary migration is not captured by balance of payments trade data.[4] Furthermore, the quality of the data may be variable and there can be very large discrepancies between reported exports and imports. Some of the difficulties with data on trade in services can be explained by factors such as reporting difficulties, collection methods (company surveys rather than customs records), varying timelines of implementing Balance of Payments (BPM5) methodology and rules, the treatment of certain services categories, and the complexity of the structures and operations of multinational firms (OECD, 2004a).

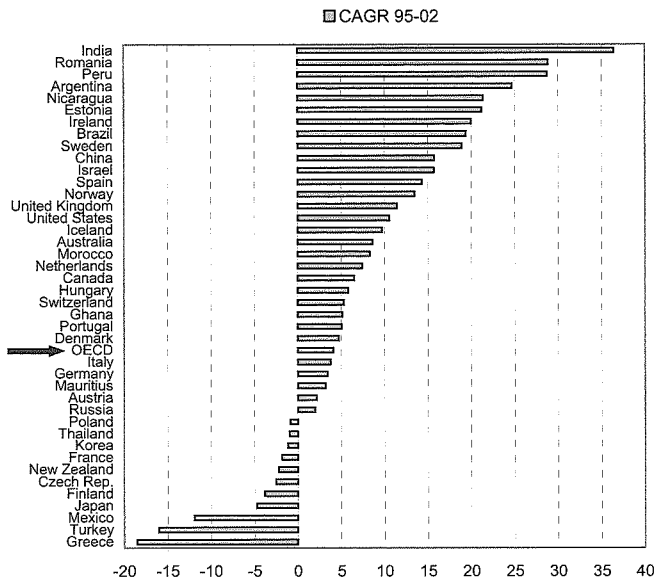


Source: *2004 OECD Information Technology Outlook* (Chapter 2), based on IMF Balance of Payments Database (November 2003)

Figure 7.2 Share of the value of reported total[5] exports of other business services and computer and information services, selected countries, 1995 and 2002. Decreasing order of the total reported value share in 2002, percentages

4 See van Welsum (2003) for a discussion.

5 The reported total for all countries does not necessarily correspond to a world total. For some countries, such as India, it is not possible to break down the data to isolate other business services and computer and information services. As a consequence, for India, the category includes total services, minus travel, transport and government services (i.e. including construction, insurance and financial services as well as other business services and computer and information services).



Source: *2004 OECD Information Technology Outlook* (Chapter 2), based on IMF Balance of Payments database (November 2003)

Figure 7.3 Growth of the value of exports of other business services and computer and information services for selected countries, 1995-2002. Compound annual growth rate, percentages

7.4 What can be learned from employment data?

7.4.1 Anecdotal data and projections

Labour costs and skills shortages are among the drivers of international sourcing, and the current media focus is on the offshoring of services jobs so it is important to see what can be learnt from employment data, and from occupational employment data in particular. However, most data on changes in employment are anecdotal (illustrated in Table 7.1) or based on model projections, which vary widely across sources and studies, as illustrated by the example for the US (Table 7.2).

Table 7.1 Services outsourcing: the case of India (as of September 2003)

	Latest manpower	India manpower	Plans for India office	Job cuts announced/ carried out in the last 12 months
Accenture	65,000	3,500	8,000 employees by August 2004	1,000
Adobe Systems	3,250	185	250 people in 6 months	260
Cadence	5,000	315	Doubling team in 4 years	500
Cap Gemini	56,500	800	2,000 people by December 2003	1,000
Cisco	34,466	2,300	NA	Have frozen hiring engineers globally but have continued to increase India outsourcing
Covansys	4,556	2,000	2,800 people in 1 year	200
CSC	92,000	1,200	4,800 people by 2004	607
EDS	138,000	300	2,400 people by 2005	8,200
i2	2,800	1,000	Recruiting actively	Nearly 1,800 people
IBM Global Services	150,000	3,100	10,000 people in 3 years	Nearly 2,000 people
Intel	79,200	950	3,000 people by 2005	4,700
Keane	5,819	623	2,000 people by end 2003	607
Logica-CMG	24,000	350	1,000 people by end 2004	2,650
Lucent	35,000	570	NA	13,800
Microsoft	55,000	200	500 people in 3 years	Increasing workforce
Oracle	40,000	3,159	6,000 people in the next 12 months	200
Sapient	1,500	600	Growing the India Center and Global Delivery	863
SunMicro	36,000	700	Growing the India Center	5,480
Syntel	2,700	2,000	650	NA
Texas Instruments	34,400	900	1,500 people by March 2006	800 personnel
Xansa	5,583	1,200	6,000 people in a few years	502

Source: Morgan Stanley, 2003

Table 7.2 US projected job losses in perspective

Total number of jobs in the US economy: 140 million		
Jobs lost to date	**Projected job losses**	**Jobs at risk**
300,000-995,000	3.3-6 million	14.1 million
Goldman Sachs 300,000-500,000	Forrester Research 3.3 million over 15 years*	UC Berkeley 14.1 million
Business Week 400,000-500,000	Goldman Sachs 6 million over 10 years	
Economy.com 995,000		

* Of these, 473,000 are expected to be in the IT sector.

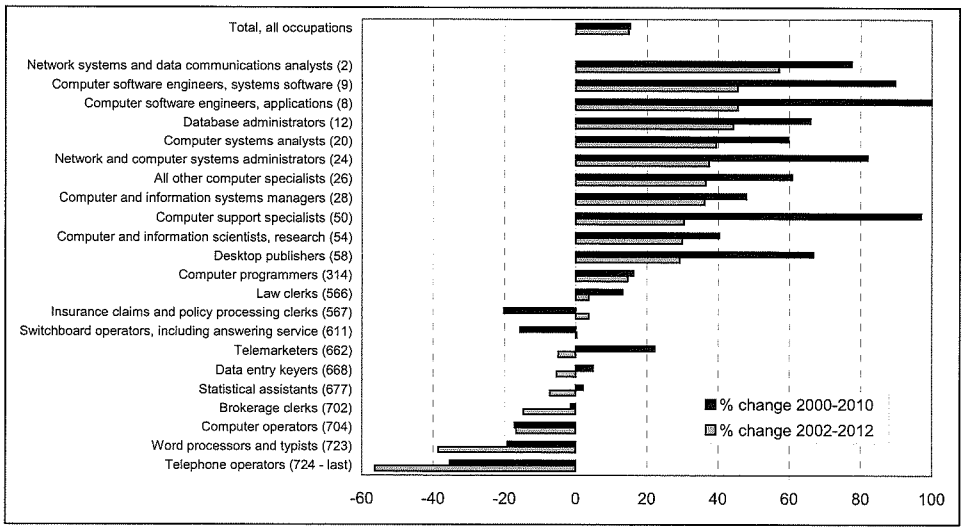
Source: Centre for American Progress, http://www.americanprogress.org (accessed September 2004)

The large differences in the numbers given by different sources illustrate the difficulty of measuring the international sourcing phenomenon as well as its impact. To put these numbers into perspective though, some 15 million jobs disappear in the US economy each year, and slightly more are being created on average. While most other OECD economies experience relatively lower churn rates than the US, it is still the case that even the largest projections of jobs 'lost' to offshoring are still small in comparison to annual churn, and most job terminations are not related to offshoring (OECD, 2004b).

While the current debate focuses on services jobs being affected, this does not mean that services employment will necessarily contract. Many existing services sectors have expanded, new services have emerged, and with ongoing technological developments and services trade liberalisation is it likely that yet more are to be created. The offshoring phenomenon itself will also create new jobs in the domestic economy (OECD, 2004b). The efficiency and productivity gains achieved through offshoring are also expected to enhance the overall growth and employment opportunities of both the domestic and host economies and should result in further job creation (see for example Global Insight, 2004; Mann, 2003). In addition, jobs created offshore generate demand for developed country goods and services exports - for ICT equipment and communications services immediately and, over time, for a wide range of consumer goods. At the same time, wages and prices in offshore locations are likely to rise, creating wealthier host country consumers and reducing the wage cost differential and arbitrage opportunities.

Even though many ICT jobs are being affected by the offshoring phenomenon, the occupational projections from the US Bureau of Labor Statistics (BLS) show an increase in the number of US ICT professionals for the period 2002-2012, although their ten-year estimates have been revised downwards from two years previously (Figure 7.4).[6] Other occupations which use ICTs intensively are projected to decline. While part of this decline may be the result of international sourcing, some occupations are likely to disappear anyway as they will increasingly become digitised and/or automated.

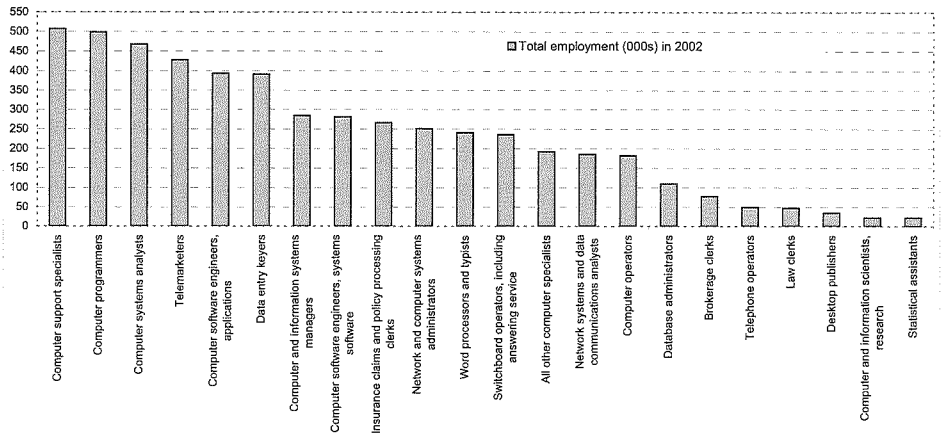
6 Of the 30 occupations that are expected to experience the fastest growth rates, eight are ICT specialist type of occupations. The others are health and life style related occupations, and a few teaching and environment related occupations. These 30 occupations accounted for 5.2 percent of total employment in 2002, and the eight ICT-related occupations alone accounted for 1.5 percent of total employment.



Note: These selected occupations combined accounted for 3.6 percent of total employment in 2002.
Source: Authors' calculations based on BLS (2004) and BLS (2001)

Figure 7.4 Comparison of BLS occupational employment projections for the US 2000-2010 and 2002-2012, selected occupations

It is important to bear in mind that these occupations are growing from a relatively low level (Figure 7.5). Together they accounted for 3.6 percent of total employment in 2002.



Source: Authors' calculations based on BLS (2004)

Figure 7.5 Employment in selected occupations in the US in 2002

The US Bureau of Labour Statistics has also started to collect mass layoff statistics associated with domestic and overseas relocations.[7] The numbers indicate that in the first quarter of 2004 around one third of separations of workers resulted from activities moving abroad; the remainder were due to domestic relocation[8] (this corresponds to the top row in Figure 7.1). It also appears that international insourcing accounts for around two-thirds of total offshoring and international outsourcing for one-third (right column in Figure 7.1), a finding confirmed by various studies and surveys (e.g. McKinsey & Company, 2003). Layoff events associated with the relocation of production activities accounted for 14 percent of all layoff events (and nine percent of separations for reasons other than seasonal or vacation). This type of data is not currently available for other countries, but surveys show that in Europe domestic relocation and relocation within Europe (which could perhaps be compared to US domestic interstate relocations) account for a large share of total relocation.

7.4.2 A skills approach

The *2004 OECD Information Technology Outlook* (Chapter 6) presents the results from a new type of analysis using occupational employment data. This work consisted of defining ICT-skilled employment (those who use ICTs intensively in order to do their own work, both basic and advanced users, plus ICT specialists), calculating the share of such employment in total employment and distributing these across all sectors of the economy. This analysis was carried out for Europe, the US, Australia, Canada, Japan and Korea. No effort was made to harmonise occupational classifications across countries, but the same rationale and logic were applied to the individual countries' data (OECD, 2004a; van Welsum & Vickery, 2004).

The results show that many services sectors, as well as certain manufacturing sectors, have a high percentage of such ICT-skilled employment, and this is true across countries. There are also some differences. For example, while wholesale trade is found to have a high share of ICT-skilled employment in most countries, the results differ for retail trade, which is found to have a relatively lower share of ICT-skilled employment for the EU-15 than certain retail sectors in the US. While this could be explained by the lack of harmonisation across occupations and sectors, and by other factors such as differences in firm size (which the analysis does not control for), it does confirm the results obtained by other studies which examine the ICT intensity and productivity of sectors by looking at capital investment.

As many of the jobs that are potentially offshoreable will be intensive users of ICTs, the ICT-skilled employment approach can provide some useful initial insights and can subsequently be adapted for more in-depth analysis. The results from the ICT-skilled employment approach indicate that, overall, less than five percent of total employment is classified as ICT specialists, and between 20 to 25 percent as broadly ICT-skilled intensive users

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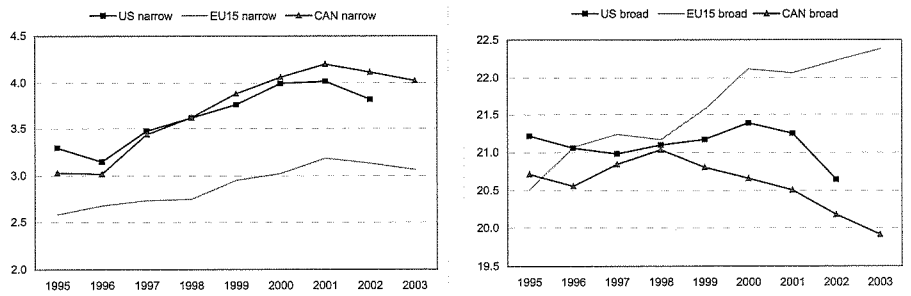
7 See the BLS website for more information: http://www.bls.gov/news.release/reloc.toc.htm (accessed September 2004).

8 These statistics reflect job losses (associated with domestic and overseas relocation) in companies employing at least 50 workers and where at least 50 people filed for unemployment insurance during a five-week period and where the layoff lasted for more than 30 days (around one-third of these mass layoff events).

(Figure 7.6). However, as this broad number includes the ICT specialists group which, in turn, includes occupations such as cable layers, the category that can be defined as potentially offshoreable might be expected to be somewhat lower. While this preliminary analysis suggests that around 20 percent of total employment may be affected by offshoring, this does not mean that these jobs will actually move but merely that they could potentially move.

The share of intensive users and ICT specialists in total employment is declining, both in the US and in Canada. While perhaps not much can be inferred from the levels (as the classifications across the three geographical entities are not harmonised), the trend is very interesting. Even though the trends cannot be explained with certainty, the declining share in the US and Canada would be consistent with the offshoring of IT and back-office activities (even though this could probably not account for all of the decline), although this is more difficult to explain for Canada which is also known to be a host of business process outsourcing. The rising share in the EU-15 is remarkable in light of the trends for the US and Canada, but would be consistent with a general increase in services employment and with the finding from surveys that European firms tend to offshore within Europe (Huws & O'Regan, 2001).



Notes: Includes estimates where a full dataset was not available. Due to classification changes, the number for the US in 2003 has not yet been included.

Source: van Welsum & Vickery (2004), based on EU LFS, US Current Population Survey, and Statistics Canada (2004)

Figure 7.6 The share of ICT-skilled employment in total employment for ICT specialists and ICT (intensive) users; US, EU-15 and Canada, 1995-2003, percentages

The importance of these types of occupations is illustrated at the sectoral level in Table 7.3, for the EU-15 in 2002, showing all industries with a share of broad ICT-skilled employment (i.e. people who use ICTs intensively at both a basic and advanced level, plus specialists) in total employment in excess of 30 percent. Many, especially at the top, are services sectors. This result is also found for other countries (OECD, 2004a; van Welsum & Vickery, 2004).

Table 7.3 The share of ICT-skilled in total employment, EU-15, 2002

	Industry (NACE 2-digit)	Percentage
72	Computer and related activities	84.2
66	Insurance and pension funding, except compulsory social security	74.8
65	Financial intermediation, except insurance and pension funding	69.2
67	Activities auxiliary to financial intermediation	67.9
30	Manufacture of office machinery and computers	57.1
74	Other business activities	50.4
70	Real estate activities	46.1
40	Electricity, gas, steam and hot water supply	45.1
32	Manufacture of radio, television and communication equipment and apparatus	44.8
51	Wholesale trade and commission trade, except of motor vehicles and motorcycles	42.7
11	Extraction of crude petroleum and natural gas; service activities incidental to oil and gas extraction excluding surveying	42.0
73	Research and development	41.3
24	Manufacture of chemicals and chemical products	35.9
31	Manufacture of electrical machinery and apparatus, n.e.c.	35.3
23	Manufacture of coke, refined petroleum products and nuclear fuel	35.2
64	Post and telecommunications	32.6
71	Renting of machinery and equipment without operator and of personal and household goods	31.4
33	Manufacture of medical, precision and optical instruments, watches and clocks	31.0

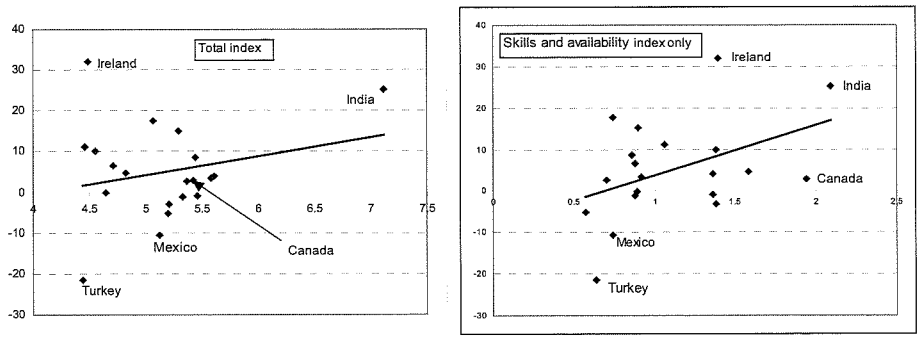
Source: OECD, 2004a

The importance of skills and human resources as a factor in offshore location decisions is also illustrated in Figure 7.7, showing a positive correlation, overall, between those countries that are considered to be attractive locations for the international sourcing of activities in the AT Kearney index and those that have experienced strong growth of exports of other business services and computer and information services.

To analyse the offshoring phenomenon further the analysis presented in this paper will be extended and adapted. Time series data on employment by occupation by industry will be collected from as many countries as possible, and several changes will be made in this new work. In particular, the selection of occupations will be revised to better reflect occupations that are potentially offshoreable,[9] while still relying on the idea that those occupations that use ICTs intensively (and include many tasks that can be codified

9 Kirkegaard (2004), based on information provided by Forrester Research identifies the following main US SOC occupational categories as being 'threatened by offshore outsourcing': 11-0000 Management occupations; 13-0000 Business and financial operations occupations; 15-0000 Computer and mathematical occupations; 17-0000 Architecture and engineering occupations; 19-0000 Life, physical, and social science occupations; 23-0000 Legal occupations; 27-0000 Arts, design, entertainment, sports, and media occupations; 41-0000 Sales and related occupations; 43-0000 Office and administrative support occupations. In 2002, these occupations accounted for around 44 percent of the total sample.

and/or do not necessarily require face-to-face contact) are also more likely to be affected by offshoring. Secondly, a distinction will be made between high- and low-skill white-collar occupations, at least at the aggregate level, to look for evidence of back-office offshoring. At the sectoral level this means that fewer sectors will be available for analysis as the cell sizes for some may become too small. However, for sectors with high shares of ICT-skilled employment to start with, i.e. most services sectors, this analysis should still be feasible at the sectoral level. Finally, the evolution of certain occupations, as well as the occupational content of sectors of particular interest will be examined over time.



Notes: Average annual growth of exports of other business and computer and information services in percentages on the vertical axis, and AT Kearney's 'offshore location attractiveness' index on the horizontal axis. The total index is comprised between 1-8, the skills and availability index between 1-3.

Source: van Welsum, 2004; based on IMF Balance of Payments (November 2003) and AT Kearney, 2004

Figure 7.7 Cross-plot of the average annual growth rate of exports of other business and computer and information services and the 'offshore location attractiveness' index

7.5 Conclusions

The international sourcing of IT and ICT-enabled services is growing rapidly. It seems to be reasonably distributed across countries even though some major suppliers, such as India, have emerged. Exports of other business services and computer and information services, which are used to approximate international services sourcing, are growing rapidly in many countries, with the fastest growth occurring mainly in non-OECD countries.

Preliminary results from the analysis of occupational employment data suggests that some 20 percent of total employment is likely to be affected by the international sourcing of services activities. Most of these are clustered in services sectors such as financial and insurance services and computer and information services. The offshoring of services activities has also generated considerable debate, especially since it increasingly involves high-quality service jobs. However, even the largest projections of 'jobs lost to offshoring' are relatively small in comparison to general job churn and, if history is a guide, growing open economies should be able to adjust and thrive.

The adjustment process may be costly though, especially for those who have lost their jobs. Education and training programmes should be adapted to enable people to take advantage of new employment opportunities and lifelong learning and skill upgrading will become the norm. A change in mentality will be needed as people are increasingly likely to have multiple jobs and even careers. Thus, a measured response to international sourcing would be to take advantage of the benefits while managing the adjustment process and maintaining good labour conditions and social welfare provisions everywhere. Countries should also remain committed to liberalising trade in services and avoid a protectionist response.

In the absence of official statistics, little is known about the impact and extent of the phenomenon. This paper has examined indirect sources, trade data and occupational employment data, and further research is needed. The paper has presented preliminary results from a new approach that exploits existing data and has outlined the next steps in this work.

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8 Coding and classification of sectors and occupations in the *e*Economy[1]

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Abstract

This paper looks at the ways in which industrial sectors and occupations are currently classified and coded, with a particular focus on 'knowledge-based' industries and occupations. Drawing on results from the EMERGENCE and STILE projects as well as a critique of various models of the 'knowledge-based economy' it argues that a much more differentiated classification of business services is required if new developments, such as the growth of outsourced call centres, or offshore software supply, are to be tracked. The 'New Economy' can best be understood as an elaboration of the social division of labour in the 'old economy' in which informatisation has led to an increasing differentiation and standardisation of business functions which is in turn accompanied by a growth in the outsourcing and relocation of these functions in ever-lengthening value chains. Unless these outsourced or relocated activities are separately visible in the employment and trade statistics it is impossible to measure the relative progress of regional or national economies towards a 'knowledge-based economy'. The challenge is not simply to develop new classification categories but also to change the mindset of those who collect and code economic data. Results are presented from a STILE coding experiment which demonstrates dramatic differences in the ways in which 'eEconomy' activities are coded.

8.1 Introduction

For as long as economic statistics have been collected by the governments of nation states, it has, of course, been important to ensure that they are classified consistently, according to well-understood rules which make it possible for comparisons to be carried out both longitudinally (in order to track trends over time) and horizontally (in order to compare different regions, or other subcategories at the same point in time) with some degree of accuracy. In recent years, a number of factors have come together to render these goals even more important, but also make them more problematic to achieve.

One of these is a general trend for public policy to become more firmly evidence-driven, with an increasing demand by policymakers for up-to-date information which makes it possible to monitor, compare and evaluate the success of different policy options.

A second is the increasing globalisation of economies, making it more than ever important to have statistics which make it possible to make international comparisons.

1 This chapter draws heavily on the work of Imogen Bertin, Simone Dahlmann, Tamás Koltai, Markus Promberger, Nicola Tickner, Peter van der Hallen, and Roel Verlinden, as well as the coding teams in Ireland, Germany, Hungary, the Netherlands and the UK whose contributions are acknowledged with gratitude.

A third has been a growing recognition of the importance of a 'knowledge-based' or 'information' economy to development. This is encapsulated in the EU in the goal of the Lisbon Summit to make Europe 'the most competitive knowledge-based economy in the world capable of sustainable growth, with more and better jobs and greater social cohesion', and its related aims of improving employment both quantitatively and qualitatively.

The notion of a knowledge-based economy raises major challenges for statisticians. Not only must they decide which economic activities (industries and occupations) should be classified as part of this knowledge-based economy; they must also identify key indicators which can be used to benchmark progress towards the development of such an economy. In the EU, the *eEurope Action Plan* and its extensions provide examples of such an attempt.

These economic indicators have an importance which goes far beyond the academic: major policy decisions may be recommended (and sometimes even made) on the basis of the interpretation of such statistics. To give one example, an influential recent book by William W. Lewis, the Founding Director of the McKinsey Global Institute, in a self-explanatory chapter entitled 'Europe, falling behind' supports its case by exhibiting statistics which indicate that the service sectors represent only around 60 percent of total employment in Germany and Italy, compared with over 70 percent in the United States. On such evidence an argument is built for reducing the minimum wage in Europe and replacing it with an earnings-related tax credit. But what if these statistics are not comparing like with like? What would be the status of such arguments if it could be shown that in reality there are proportionally just as many 'service' workers in these EU Member States as in the US but they have simply been allocated to different categories because of different coding practices?

8.2 The problem of the 'sector' in the *e*Economy

The development of the *e*Economy has rendered many of the classification systems which have traditionally been used to differentiate industries and product types either irrelevant or, at least, extraordinarily difficult to apply.

A number of factors have contributed to this.

- There has been a very rapid convergence between formerly disparate sectors resulting in part from changes in technology. This can be illustrated by means of one example. Companies involved in the development of multimedia software may have evolved from parents formerly involved in computer manufacture (a sub-branch of metal-based manufacturing); publishing (a sub-branch of the printing sector which was traditionally in turn a sub-branch of 'other manufacturing'); toy-making (also historically classified under 'other manufacturing'); film distribution (classified as a miscellaneous service industry); broadcasting (because of its evolution from national public broadcasting authorities, often classified alongside other public sector services); software development (a sub-branch of 'business and financial services'); or telecommunications (generally classified alongside postal services, again for historical reasons).
- The rapid transformation of products and services due to technological innovation renders it difficult to make comparisons over time, either qualitatively or quantitatively; it thus becomes extremely difficult to monitor longitudinally the development of any given 'sector' with any degree of accuracy. This can be illustrated by developments such as mobile telephony and its associated services, or the creation of new ICT prod-

ucts (such as telephone ring-tones, or software packages) which can be downloaded from the Internet.

- Increasing cross-ownership resulting from the dominance of large, generally transnational, corporations with interests across a range of different sectors, - which already poses problems of classification - is complicated still further by mergers, demergers, investment and divestment. A growth in the scope and complexity of strategic alliances, public-private partnerships and other practices further blurs the boundaries between corporations.
- Corporations are fragmented by various forms of business process re-engineering, outsourcing, 'insourcing' or 'hollowing out'. The development of these increasingly elaborated and fast-changing patterns results in activities previously treated as internal overheads becoming reconstituted as separate cost centres or profit centres and, very often, externalised. However the companies involved in supplying these external services may themselves be involved in similar processes of fragmentation, resulting in exceptionally complex interpenetrating corporate networks.
- The development of large new companies supplying a range of business services on an outsourced basis has blurred the distinctions between different business services. For instance a single company might offer, from several interlinked remote locations, a range of different business process functions including customer service, sales, database management, network management and software development or maintenance.
- The continuously accelerating speed of change renders many of these developments provisional and transient. This creates additional problems for classification systems which have to distinguish between developments which seem likely to be long-lasting enough to deserve a new category and those which are merely transitional.
- The 'call centre problem' illustrates a specific classification difficulty, raising the question of whether a call centre should be defined as such, or in relation to the function being carried out within it (e.g. telesales, customer services, technical support or debt collection) or to the parent sector (e.g. financial services, transport services or telecommunications).
- The growth of *e*Commerce has blurred the boundary between wholesale and retail distribution, traditionally classified separately.
- Another problem refers to changes in delivery media. For instance should a publisher be redefined when it switches the emphasis from producing printed materials (or recorded records or tapes) to supplying them on CD or DVD or in forms which are downloadable from the Internet?

Because its core business generally involves the processing of digitised information, and because it has recently been the locus of major upheavals as a result of the rapid introduction of ICTs, the business services sector stands at the heart of this cluster of classification problems and, indeed, at the heart of the *e*Economy. It can be argued that the very emergence of this sector as a significant one in any economy can be traced back to the increasingly elaborate division of labour which has arisen in all other sectors as a result of the introduction of new technologies and the division of previously integrated processes into separate sub-processes capable of being carried out by a different group of workers, separated spatially (e.g. on a different site) or contractually (e.g. employed by a different employer) or both. The definition of this sector is therefore highly sensitive to decisions about what constitutes such separation. The crucial question here is at what point an

internal service function previously regarded as integral to a production or other process becomes defined as a separate service function, deserving of its own categorisation in the classification system.

The delocalisation of information-based work has also compounded problems of determining what should be the unit of analysis in industrial classification. Because of requirements for companies (or other legal entities) to file their accounts or otherwise register their existence with the authorities, data sources based on the 'firm' are found more commonly than those based on the 'establishment' (the geographical unit of analysis). However there are a number of problems with firm-based statistics, some of which are exacerbated in the context of the *e*Economy. In particular, as noted above, the disaggregation of firms, together with a growth in practices such as outsourcing and the development of strategic alliances, has made it increasingly difficult to disentangle the complex contractual relationships between firms and explore their relationship to particular geographical sites. In addition, economic activities may be shifted from one site to another without any obvious physical change, despite changes in the functions involved or the legal relationship. An example of this might be the use of surplus capacity in a remote call centre offering technical support to a company's own customers to offer outsourced call centre services to another firm for another function, such as telesales.

As a result of these combined difficulties, a large number of establishments appear at present to have sectoral codes which do not accurately reflect what is actually going on within their walls. In a Europe-wide survey of some 8,000 establishments, the EMERGENCE project found a number of anomalies. For instance, of the establishments reported as offering 'software consultancy and supply' and 'other computer-related activities' (for which NACE codes exist) only 24 percent of cases were coded under these categories. Even more strikingly, less the one percent (0.38 percent) of those offering data processing services were recorded under the relevant NACE classification (7230, 'data processing'). Similar anomalies were to be found in the other business services investigated in the EMERGENCE survey (Huws & O'Regan, 2001).

8.3 The concept of the 'occupation' in the *e*Economy

New information and communications technologies have not only challenged the traditional conception of the 'sector'; they have also rendered problematic the concept of the 'occupation', at least for those workers whose jobs involve the handling of information. Here too several trends have converged to render obsolescent many of the stable occupational identities which, in the past, were entered into by young people leaving school or college and then adhered to for a whole working lifetime. In some cases, the death of the old occupational identity was brought about directly by the obsolescence of old technologies. In other cases, boundaries between older occupational identities have become blurred in response to increasing demands from employers for multiskilling, and to the rapid speed of technological change which created continuous demands for new skills whilst simultaneously bringing about convergence between old ones. Employers' demands for particular combinations of 'skills'. 'Competences' and 'knowledge' can be seen as counterpoised to workers' aspirations to a stable occupational identity carrying with it a reasonable expectation of career progression along a predictable path. The compromise

between these conflicting demands may well result in uneasy and contingent occupational profiles.

The use of a computer, generally using standard software, has become so generic a feature of so many professional, managerial, technical and clerical jobs that it has now become increasingly difficult to draw a clear boundary between those features of the job which are content-specific and those which require an ability to use ICT effectively. It might be argued that generic ICT skills are now as essential as basic literacy and numeracy and should therefore be discounted. In practice, however, it is clear that there are some jobs in which ICT actually forms the main content, or for which knowledge of a particular technology (e.g. a specialist software package) is the essential requirement. There will therefore probably remain for the foreseeable future an uneasy overlap between jobs which are defined by their use of ICT and those which, although involving extensive use of it, continue to be defined in relation to some other function.

Although they parallel some of the problems encountered in sector classification, occupational issues differ in their specific features. Some relate to a core question in the classification of occupations: should an occupation be defined in relation to the qualifications required to do it? (e.g. a doctor or an accountant); to the tools used to carry it out? (e.g. a lathe operator or a forklift truck driver); to the level of seniority of the post-holder? (e.g. a supervisor or a managing director); to the sector in which the work is carried out? (e.g. an insurance salesperson or a civil servant); or to some combination of these? (as frequently happens in practice). Some specific problems which arise in occupational classification in the *e*Economy include:

- a very rapid obsolescence of a range of traditional occupational groups defined in relation to tools and technologies which have now been replaced by ICTs. Such occupations included categories like 'pattern-cutter', 'typesetter', 'key-punch operator', 'draughtsperson' and 'telephone switchboard operator'. Their distinctive skills and identities have now been replaced by a single generic (though rapidly evolving) new technology - the telecommunications-linked computer. To reclassify these workers into a new category of 'ICT worker' would create a category so large as to be meaningless, given that over half the workforce in most developed countries now uses these technologies for a significant part of the working day;
- a contrary and related problem relates to the fact that very many other occupations defined in other ways (including secretaries, managers, lawyers, architects, graphic designers and many more) which have still retained their traditional occupational identities, now in practice require ICT skills in order to be carried out. Should the occupational classification be changed to reflect this? And if not, how should those who hold the formal qualifications for the job but lack the technical skills and are therefore effectively unemployable be coded?; it is thus often difficult to distinguish between occupations whose 'core' activity is technical, i.e. those directly connected with the development or maintenance of IT, and those workers who use generic IT tools but whose current job designation does not refer to them;
- another related problem is the increasing need for multilingual skills in occupations involving cross-border communication in a global economy. Whilst these are increasingly demanded in job advertisements, they rarely figure in occupational descriptions;
- the restructuring of organisations referred to above, involving a disaggregation into smaller units combined with spatial or contractual separation of functions, has also changed the nature of the skills and knowledge required to do a range of jobs. Increas-

ingly, job-specific skills need to be complemented by more generic skills such as communication skills, ability to negotiate with remote suppliers, management and self-management skills. An example of this might be a software engineer whose job description changes to that of a project manager when the work of the department is partially outsourced or relocated;
- flattening of hierarchies within organisations has added to this redefinition of jobs by changing the allocation of management tasks. This makes the 'problem of seniority' more acute than in the past, particular in situations where job titles may not reflect the realities of control and decision making within a particular organisation. This problem is rendered even more challenging in comparisons between large and small organisations;
- the growth of multi-tasking or 'internal flexibility' has also blurred many boundaries within organisations;
- in some countries, additional difficulties may sometimes be caused by a shift of activities between sectors. For instance when public services are outsourced or privatised, a job description related to a particular grade in a public service hierarchy (such as 'senior executive officer') may be transformed into one which is much more technically-specific or company-specific (such as 'call centre quality control manager') even if the actual work remains substantially the same;
- a further classification difficulty is sometimes caused by the location of the work, for instance when staff who work on customers' premises or multilocationally are defined differently from those doing essentially the same job from the company's own premises communicating with customers using ICTs;
- in addition to a redefinition of existing occupations the development of ICTs has also introduced some entirely new occupations. Some of these, such as 'call centre operator', are beginning to make their appearance in occupational classification schemes (e.g. in the UK's SOC 2000). However there is some evidence that workers do not identify with these new job titles, leading to considerable underestimation of their numbers. In spring 2003, for instance, only 81,000 call centre agents were recorded by the UK Labour Force Survey, although it is known from other sources (such as industry estimates derived from shipments of workstation units) that there are more call centre workers than this in a single British city such as Leeds or Liverpool, with the total number of call centre workers in the UK estimated conservatively at well over one million (Paul & Huws, 2003). Many other new occupations, such as 'webmaster' or 'network architect', have yet to appear in the classification schemes;
- in new occupations, references in job advertisements and job descriptions are frequently made to specific software packages (e.g. a job may be described as a 'JavaScript programmer'). Such descriptions may be highly relevant in the labour market but are often transient in nature. Whilst some may be reclassifiable within broader generic categories, this may often be beyond the capacity of any but the most specialist coder.

The challenges summarised here are rendered even more problematic by major differences in national qualifications systems and nomenclatures. The STILE project focused on occupational classification, considering that the related issue of the codification and benchmarking of qualifications, though crucially important, lay beyond its remit.

8.4 The STILE coding exercise

The STILE project attempted to address these vexed classification and coding issues inductively by designing an experiment in which descriptions of establishments or jobs were presented to coders to see how they would be classified, the aims being firstly to find which classification categories were used for sectors and occupations in the *e*Economy and secondly to identify specific issues giving rise to classification difficulties. A major challenge was to find a method to construct some provisional hypotheses which could then be tested in the light of the results of the coding exercise.

This was done by identifying several key issues in sectoral and occupational classification. In relation to sectors, for instance, these issues included the 'outsourcing problem', the 'wholesale versus retail problem', the 'software versus application' problem, the 'branch versus parent activity problem' and the 'delivery medium problem'. In relation to occupations, they included the 'generic versus specialist' problem, the 'convergence of skills' problem and the 'when does a senior practitioner become reclassified as a manager?', or 'seniority' problem.

For each of these issues a five-point spectrum was constructed. At either end of the spectrum was a case which seemed unproblematically to fall within an existing coding category. In the case of the 'outsourcing problem', for instance, a case which was clearly a core internal activity of a company would represent one extreme, whilst a case which involved a 100 percent outsourcing arrangement would represent the other. This hypothetical range is illustrated in Table 8.1. At the mid-point between these extremes, in each case, a 'faultline' was identified, involving a hard-to-code case which included features from both extremes, with intermediate cases arranged in between. In each case, each of the two extremes would normally be expected to involve a different coding solution.

Table 8.1 Example: the 'outsourcing problem' - five-point spectrum of possibilities

The outsourcing problem				
Extreme A	*Intermediate tending towards A*	*'Faultline' case*	*Intermediate tending towards B*	*Extreme B*
Operation totally in-house, in head office	Separate cost centre but in same building	Separate cost centre; different site	Subsidiary owned by same parent company; different site	Owned by another company; different site

Two five-column matrices were constructed to create a framework within which to place 150 descriptions of establishments, for sectoral coding, and 150 job descriptions, for occupational coding. It must be emphasised, however, that this scheme was not expected to reflect the full spectrum of cases likely to be encountered in reality so much as a way of 'positioning' cases in order to test hypotheses about the sorts of issues likely to cause coding difficulties.

It was recognised that new ICTs have impacted production industries as well as service ones (for instance in the creation of new ICT-related products such as palm-top computers or mobile phones or in the embedding of ICTs into older products, such as cars or

washing machines). However it was felt that such cases offer fewer challenges to industrial and occupational classification schemes and it was decided to omit them from the STILE experiment. In order to keep the structure manageable and retain a focus on the most problematic areas, it was decided to restrict the field to activities which involve an intensive processing of digitised information - in accordance with most definitions of the 'knowledge-based' or *e*Economy. In practice these mainly fall within the sectors currently defined as business and financial services. However because these services cut across other sectors (having traditionally formed the basis of a range of in-house office services), they may involve activities currently classified under their traditional 'parent' sectors, for instance in manufacturing or miscellaneous or public services. There is also considerable overlap with some of the media sectors, such as broadcasting, telecommunications and publishing. These were included where deemed relevant.

The five-column sector matrix therefore mainly covered establishments involved in business services, content-generation or content-processing functions. It was not, however, expected that all would be classified as such. Many lay in positions across a spectrum which led us to expect that they would be classified according to the 'traditional' product or service with which their activities were associated. Similarly, the occupation matrix focused on jobs which involved some use of ICT, but - deliberately - to varying degrees.

In the second stage of the work, real-life examples were sought of establishments or occupations which fitted the cells of the matrices. These were derived from a number of sources, including business directories, job advertisements and cases from past surveys carried out by the partners. A large number of the cases were drawn from databases held by the Irish national government's training body, FÁS, and its planning body, Forfás. These were all carefully anonymised before being circulated and used. Other sources used included anonymised case studies from across the EU and New Member States carried out by the EMERGENCE and TOSCA projects, the UK 'Personnel manager's yearbook' (which includes descriptions of the companies in which personnel managers are based), Internet searches, trade directories and Yellow Pages.

The original aim of the team was that at least two cases would be identified to match each cell in the matrices which had been developed. However it was found that in practice there were large numbers of cases corresponding to certain cells whilst other cells existed more as hypothetical possibilities than as reality. More importantly, the majority of cases illustrated more than one 'problem' and fitted into several different cells. In order to match the twin goals of on the one hand selecting cases which are typical of the new realities of the *e*Economy whilst on the other ensuring a broad spread of examples covering all the main features identified as problematic, a balance had to be struck. This entailed considerable modification of the matrices and the inclusion of a larger number of cases in some categories, especially in call centre-related sectors and in ITC-related 'new' occupations, whilst other cells remained empty.

In parallel with the identification and sorting of the fictionalised case descriptions, discussions were taking place with national statistics offices and other bodies with responsibility for sectoral or occupational coding in Ireland, Hungary, Germany, the Netherlands and the UK. These discussions were not just designed to obtain agreement to participate in the coding experiment; they were also designed to identify normal coding practices in each institute so that the case material could be provided in a form which conformed most closely to the material which they typically handled. These practices

turned out to be extremely diverse and it was not possible to find a single form which matched all the normal criteria.

For instance in Ireland, a country with a very small population, sectoral coding in the LFS is normally carried out at the two-digit level for reasons of reliability and to preserve anonymity, as compared with the four-digit level in the other, larger, countries.

There were also procedural differences between countries depending on whether the international classification system for sectors, NACE,[2] or the international occupational classification scheme, ISCO,[3] was used for initial coding or whether coding was first carried out to a national scheme and subsequently translated into NACE or ISCO for the purposes of international comparison. These were compounded by differences between NACE revision 1 (used in some countries) and NACE revision 1.1 (used in others). The latter includes more differentiated categories for business services, for instance in the addition of the new category 74.86 for 'call centre activities'.

In some cases coding was an automatic or semi-automatic process whilst in others it was carried out manually. Automatic processes often carried strict limits in terms of the field size (the number of characters allowed for the description of a particular establishment or job), thus restricting the length of the description for any given case.

In order to meet as many requirements as possible whilst still ensuring that all partners were working with the same raw material, it was decided to present each case in both a short and a long form, and to ask for each of these to be coded in each country. In some institutes the short and long forms were coded together, with the coder using the long form as extra background information when difficulties were encountered in coding the short form (in accordance with normal national practices); in others, the two exercises were carried out separately, thus providing an interesting check on whether the coding changed when additional information was supplied. The longer forms of wording, drawn as they were from 'real life' examples, often included descriptive details which were regarded as probably irrelevant to the coding decision.

Because one of the aims of the exercise was to gain an insight into the coding process itself, coders were asked to do rather more than their normal coding activities by underlining the key words or phrases in the descriptions that had influenced their choices and commenting on any difficulties they had encountered or extra information they would have liked.

It was recognised by the team that variations in the results of the *coding* exercise would not necessarily shed light on particular *classification* problems. A number of possible causes for coding variations could exist, including:

- variations in practice by an individual coder;
- variations between different coders within a team, perhaps reflecting differences in training, background, experience, seniority or just individual preference;
- variations between different coding teams, perhaps reflecting explicit or tacit institutional rules, perhaps simply the preferences or experience of the manager or trainer, or the priorities of different government departments;

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2 The Nomenclature Générale des Activités Economiques dans les Communautés Européennes, or General Industrial Classification of Economic Activities within the European Communities.

3 The International Standard Classification of Occupations, developed by the International Labour Organisation.

- variations between countries resulting from different national traditions, qualification systems and coding schemes;
- variations between countries resulting from the translation of international terminology into the national language(s);
- variations between countries resulting from the ways in which national codes are converted into international ones;
- variations resulting from inherent ambiguities in the international classification system itself.

Before proceeding to a comparative international analysis of these results it is necessary to make one important introductory remark. This concerns the experimental nature of the STILE exercise. As far as we are aware, this is the first exercise of its kind to have been undertaken and must be regarded more as a pilot experiment than a definitive study. It represented something of a step into the dark and we must begin by acknowledging the limitations of the methodology. Some of these, perhaps, can offer lessons for the design of further studies in this area, using larger samples and controlling for some of the unexpected problems encountered.

The first of these is that the descriptions used as the raw material for this exercise were not as complete as those normally found at a national level in most countries and reflected the Irish provenance from which many, but not all, the cases were drawn. This not only affected the terminology used to describe firms and occupations (some of which was difficult to translate into other national languages) but also the particular features of the local economy and labour market. Despite some convergence, much of it due to the development of a global information economy, it is clear that there remain strong differences between EU Member States, as well as Accession States, in the ways in which the economy is organised and occupational identities constructed. It is inevitable that coders' experience and expectations will reflect this diversity and it is in some ways an 'unfair test' to expect them to code material which is so different from that which they encounter in their everyday work. Nevertheless, with the growth in globalisation, it is to be expected that in the future multinational companies will be more and more likely to spread their normal practices (and terminology) across national borders and that, especially in the *e*Economy, such experiences will become more common in the future.

8.5 Results - sectors

The sector coding exercise was carried out in six separate institutes in five countries. In Hungary, Ireland and the Netherlands it was carried out by coders who normally code the national LFS in the national statistics offices. In the UK it was carried out by the Business Statistics Office of the National Office of Statistics. In Germany, two separate coding exercises were carried out: by the German Statistical Office (*Statistisches Bundesamt*); and the Federal Employment Agency (*Bundesanstalt für Arbeit, Bundesagentur für Arbeit,* since 2004). The German Statistical Office, which has responsibility for carrying out the Microzensus (the German equivalent of the LFS) delegates its responsibilities to the regional level; the Bavarian office took part in the STILE exercise, acting as a surrogate for its sister offices in other regions.

Analysis of the level of agreement between countries is complicated by the fact that coding was not carried out at the same level of disaggregation in all countries. Ireland coded only at a two-digit level, and the Bavarian team at the three-digit level, so the Irish and Bavarian German results could not be included in a more detailed analysis at a four-digit level. Furthermore, there were some countries in which multiple codes were assigned for some observations. If one of these codes matched those used in other countries and was counted as agreement, then this might have served to overestimate the total level of agreement; but if it was excluded, then the level of disagreement was in danger of being exaggerated.

The method used in this exercise to calculate the proportion of matched codes was as follows: the level of agreement is equal to Nc/Ng*100, where Nc is the number of times the most common code (Mode) is recorded and Ng is the total number of recorded codes. So, for example, if we had a set of four codes 67.33, 67.33, 65.23 and 63.22, the four-digit calculation was Ng=2 (Mode=67.33) and Ng=4. The percentage of matched responses was therefore 2/4*100=50 percent. We looked at both four-digit and two-digit codes (in relation both to the long and the short descriptions). Ireland was excluded from the four-digit analysis, as data were not available at that level in Ireland. For the purposes of international comparison, the three-digit codes used in the Bavarian sector coding exercise were truncated to two digits.

Not surprisingly, the highest level of agreement was at the lowest level of disaggregation. At the two-digit level, the average level of agreement for the short descriptions was 72 percent, whilst it was 64 percent for the longer descriptions. At the four-digit level this fell to 50 percent for the short descriptions and 42 percent for the longer descriptions.

At the two-digit level, exclusive of the Bavarian results, there was a failure to agree (or to code at all) in seven cases (five percent) on the short descriptions and complete and unequivocal agreement in 42 cases (28 percent) between the five national teams coding at this level. The longer descriptions produced an improvement at the lower end of the scale, with no cases involving complete disagreement or failure to code. However they also brought about a reduction in the level of total agreement, which fell to 12 cases, or only eight percent of the total, unequivocally agreeing. A further 23 cases could be added to this category when multiply coded answers were taken into consideration, raising the percentage in agreement to 23 percent.

When including the Bavarian data, this pattern changed substantially as there were no cases involving complete disagreement. The lowest level of agreement was 27 percent. The number of cases involving complete agreement was reduced to 34 cases (23 percent).

Most of the seven cases involving total disagreement involved even a failure to agree at the single digit level.

At the two-digit level, by far the largest group of cases in which there was full agreement (21 cases) was 'computer and related services' (72), a classification which seems to have been triggered by any reference to software development or programming in the short description of the case. This category was also used for cases which referred to the management or maintenance of computer-based systems or databases. This code can perhaps be seen almost as the generic 'new economy' code, referring clearly to IT in its description and providing a fallback coding option for activities which are obviously computer-related.

The second largest category is perhaps more a reflection of lack of precision than of complete agreement between all the national coding teams. This is in the consignment of

nine cases, including call centres, to the catch-all 'other business activities' category. The other cases where there was complete agreement include two where the code 80 (education) was triggered by references to the provision of training courses, 52 (retail trade) and 51 (wholesale trade) where the coding was prompted, respectively, by explicit references to retail or wholesale activities in the short descriptions, and a group of cases coded to 92 (recreational, cultural and sporting activities), all involving content-generation for film or television. It is this latter group which, when contrasted with the group coded under 72 (computer and related activities) underlines one of the areas of coding difficulty in the emerging *e*Economy. These two groups represent extremes of a spectrum in which technological convergence is producing a large intervening grey area of hard-to-code cases.

The analysis which included the data of the Bavarian coding exercise showed absolute agreement between all five countries in even fewer cases (34 instead of 42).

We now turn to the four-digit level. It should however be noted that here the comparison concerns only four countries (Netherlands, Hungary, UK and the first of the two German participating institutes) because in Ireland coding is only carried out at the two-digit level and in the Bavarian exercise it was only carried out at the three-digit level. Given this, it is even more remarkable that at the four-digit level, in the coding of the short descriptions there was a complete failure to agree (or to be able to code) in 32 cases (21 percent) out of 150 amongst the four national teams coding at this level, In only 14 cases (nine percent) was there full agreement between all four teams, a number which is reduced to 13 when we remove a case in which agreement was only reached because two of the national teams failed to agree any code at all.

Here the range of codes is if anything even higher, with many cases of disagreement at even the single digit level. Most of the short case descriptions produced at least one failure to code. One which was relatively unusual in being given a single agreed code in each country (it was not regarded as uncodable anywhere) was a case whose short description was 'R&D of telecoms hardware products aimed at the SOHO (Small Office/Home Office) sector'. This produced an astonishingly wide range of codes: 73.10 ('research and experimental development on natural sciences and engineering'), 32.20 ('manufacture of television and radio transmitters and apparatus for line telephony and line telegraphy'), 52.48 ('other retail sale in specialised stores') and 74.13 ('market research and public opinion polling').

Turning to the longer descriptions we found a slightly different picture. At the four-digit level, the number of cases with no agreement dropped to 11 (seven percent). However the number with full unequivocal agreement also fell - to a single case, although this increased to four cases when multiply coded responses were taken into account. The single case was that of a 'company carrying out foreign language translations for business clients including legal documents. The company has a small headquarters staff responsible for administration and quality control. Its translators are based at home and send and receive their work by email.' This was coded by all four countries coding to the four-digit level as 74.85 (secretarial and translation services), matching the 100 percent agreement also given to this case when it was coded according to its short description.

At the two-digit level the long descriptions produced a higher level of agreement. There were no cases where there was a complete failure to agree, but there were 12 cases with 100 percent agreement between all five participating countries. These comprised in essence a subset of that created when the same cases were analysed according to their shorter descriptions. consisting mainly of categories in the 'generic IT' category of 72

(computer-related services) and the 'catch-all' category of 74 (other business activities) together with a couple of cases assigned to 92 (recreational, cultural and sporting activities) because of their connection with mass entertainment. Interestingly, the single case where there was full agreement at the four-digit level (a case involving business translation) dropped out when the results from a fifth country (Ireland) were included. We can conclude from this that the addition of extra information helps coders to categorise cases more precisely and thus reduces the number of cases consigned to the residual, catch-all 'other' categories. However in the process of refinement and coding these cases are more likely to become scattered across different coding categories.

We can identify two reasons for this. The first is the systematic bias which may be introduced by differing tacit rules operating between different individual coders, teams, institutions or national practices. The second is a failure of NACE to provide appropriate homes for the types of economic activities which arise in the new economy.

In general, we can conclude that there is a substantial failure to agree between the various institutes which took part in this coding exercise. Not only is there disagreement between different institutes; there is also disagreement between different coders within those institutes; and these differences are compounded by further differences in the coding of the same cases according to the length of the description and the number of digits at which the coding takes place. The scale of this failure was great enough to pose a major challenge to our original hypothesis (underlying the five-column matrix model) that it would be possible to obtain agreement between all parties about the coding of the two extremes of each spectrum in order to focus attention on the precise location of the 'fault-line' between them.

It could be justifiably concluded, therefore, that our original conceptual framework was so at variance with the volatile reality that it served little useful purpose. Indeed, with such a small sample, and so much 'noise' created by the variations between individual coders' practices we might question whether any logic can be applied to the analysis of the results. As already noted, most of the 150 cases which formed the basis of this exercise illustrated more than one problem and this produced disparities in the numbers of cases in each section of the matrix. There was also considerable overlap between the problems identified. Whereas some problems were minor and discrete, others could more accurately be regarded as differing facets of larger problems. Furthermore, some issues which were not anticipated in advance, and which did not readily lend themselves to presentation in the five-column format, were identified retrospectively as a result of the analysis.

Nevertheless there were some key issues on which this exercise shed some light, although it was impossible to illuminate some others, including the 'problem of multiple activities', the 'problem of goods versus services' and the 'problem of convergence' which, whilst clearly important, were so difficult to isolate from other - often unanticipated - issues in this exercise that it is impossible to present any conclusive results relating to them in this article.

8.5.1 The importance of the delivery medium

In many cases, the introduction of ICTs represents a simple change of delivery medium by industries which continue to supply the same core product as in the past. In some cases, the product itself remains the same physical commodity it has always been. An example

of this is the case of online bookselling where a bound, printed paper-and-board book is still delivered, even though it may have been ordered over the Internet. In others the form of the product itself has changed although the content remains the same, for instance in the distribution of music in a form which can be downloaded from the Internet the recording itself - the raw material - is essentially the same as if it were delivered by means of a vinyl record, cassette, CD or DVD but the form has changed. In the process what was technically a 'product' may have become redefined as a 'service'. In more extreme cases, the content itself may have been altered in order to make it possible for it to be digitised and delivered electronically. An example of this is supplied by *e*Learning. Here an activity formerly delivered as a real-time face-to-face service (a lesson) has been transformed into a replicable commodity. This commodification process has coincided with the change in delivery medium.

A change to an electronic delivery medium may also accompany a change in the structure of a value chain, cutting out some of the intermediaries traditionally involved in delivering physical goods or services. This generates an overlap in some cases between issues relating to the delivery medium and other contentious issues, such as a blurring of the boundaries between wholesale and retail services. When the same content is delivered using both old and new media in parallel, additional coding problems may be generated by the simultaneous existence of a number of different activities, creating a problem for coders in determining what is the main activity. A further overlapping issue concerns the elision between development and delivery which may arise in relation to products and services whose content consists of digitised information. The difficulty of drawing a line between commerce and *e*Commerce could also, strictly speaking, be regarded as an issue resulting from a change of delivery medium, or at least of the medium of communication with the customer. These related issues will be discussed separately. Here we focus specifically on the problems created by the delivery medium where the content remains substantially the same.

The STILE exercise included a number of examples designed to shed light on these issues. These illustrated a number of spectra: from publishing to *e*Publishing: from entertainment to *e*Entertainment and from learning to *e*Learning. Unfortunately in none of these cases could any consistent pattern be discerned which shed light on this particular aspect of the *e*Economy.

8.5.2 Software development or application?

The development of software is often regarded as a generic activity and it is presumably such thinking which led to the creation of NACE category 72 (computer and related activities) and its various subcategories. However in practice it is often difficult to draw a hard-and-fast distinction between the relatively abstract process of writing the computer programme itself and the specific application for which it is being written. A number of the cases in the STILE exercise fell at various points along this spectrum. In relation to the short descriptions, there were several cases where all the coders agreed that the activity should be coded to 72. However the levels of agreement fell considerably when the longer descriptions were coded.

In some cases, the disagreement seemed to result from differences in coders' propensity to code according to the application. For instance in a case involving the development of

software for training courses there was a split between those who regarded it as software and those who regarded it as training. Similarly, a company which 'provided financial transaction and IT services to a group of banks and credit unions' was classified by the majority as a software company but by one coder (on the basis of the short description) under financial intermediation and by another (on the basis of the long description) under services auxiliary to financial intermediation. However there was not a single case where all the coders agreed on a code relating to the application and the underlying logic of a confusion between software and application explains only a small proportion of the disagreement.

8.5.3 Development or distribution?

Another source of possible confusion lies in the distinction between the development of a product or service and its distribution. When content is digital, the progression can be remarkably seamless. If we take the term 'development' to include the generation of content for the entertainment industry and software development some cases already referred to in these categories could be said to represent one extreme of the development/distribution spectrum and to demonstrate some degree of coding consistency. At the other extreme were cases which represent clear examples of retail or wholesale distribution which were also coded consistently, at least according to their short descriptions. These include a 'book retailer', a 'book and software retailer', a stationery retailer' and the 'Internet subsidiary of a fruit and vegetable wholesaler'.

However when the long description was offered to the coders, even these apparently straightforward cases caused some difficulty, with the level of agreement dropping below 100 percent. In between these extremes lay a number of cases which created even greater disparity. These included several cases in which the, perhaps ambiguous, word 'supply' was used as the operative verb in English. Less than 50 percent agreement was reached on the coding of an 'outsourced supplier of media services for software companies' and a 'supplier of a range of products including duplication of CDs and supplementary documentation as well as providing in-house data processing services'.

Other cases scoring a similarly low level of agreement included a company whose long description read 'manufacture, sales and service of local area network software and technology including data switches, wireless network cards and virtual private network products'. Here, however, it is possible that the problem lay with the overlapping difficulties of distinguishing between hardware and software or between products and services. Similarly hard-to-code cases included a company 'providing printing, supplies, supply chain planning, order and warehouse management, distribution and logistics management' and another involving 'the manufacture and sale of floppy disks, CDs and DVDs, the distribution of equipment for duplicating, printing and packaging these products and other associated packaging products'. Here, the issue of multiple activities is also raised, as it is in the case which involved the 'distribution of CDs and DVDs and provision of games software'.

Less dramatic degrees of disagreement were found in other cases such as the 'European operations centre which consolidates the ordering, manufacturing and distribution of an operating system'. Here, however, we find an overlap with yet another issue, that of distinguishing the branch activity from that of the parent company.

It is clear that this issue cannot be isolated from many others involved in the classification of the dynamically changing business services sector. Indeed, it provides one of many windows into a nexus of classification problems which, taking a close-up view, bring to mind the American phrase 'like trying to nail jelly'.

8.5.4 Hardware or software?

The problem of distinguishing between hardware and software is rather better known and has been explicitly addressed in some aspects of NACE as well as being the subject of rules which form part of the training of coders in some countries. For instance in the Netherlands there was an explicit rule that hardware should take precedence over software in deciding on a code in cases where both were involved. We have already noted that there were a number of cases in which all participating institutes agreed on a common code for software development activities, although there were others where this agreement was not found. It was difficult to find an equally strong consensus on the cases which we had expected to be classified at the hardware end of the spectrum. For instance there was agreement of less than 50 percent on the coding of the long description of several cases which might be expected to be categorised in this way, or which were placed on the adjacent column in our original matrix. These included a company which 'develops, manufactures and sells computer hardware to accelerate data encryption', one that 'provides card payment solutions including hand-held payment terminals, client/server processing systems and PC and terminal-based systems to process transaction cards' and a 'manufacturer of computer hardware and developer of computer software for safety technology in industrial automation' which also provided customer training and support.

There was also below-50 percent agreement on several cases providing inputs to hardware manufacture, for instance cases involving 'consultancy, design, installation and maintenance of telecommunications equipment and cabling', 'manufacture, sales and service of local area network software and technology including data switches, wireless network cards and virtual wireless products' and 'research, development, manufacture and supply of telecoms hardware products for the small office market'.

Any attempt to identify a clear 'faultline' in the division between hardware and software is thwarted by the large range of disagreement in these cases.

8.5.5 Commerce or *e*Commerce?

We have already noted a few cases where there was general agreement on a retail or wholesale classification, at least on the short descriptions, However none of these retained their clarity when the long descriptions were coded. They also overlapped with several cases in which agreement was harder to reach. A bookshop which also sold books, and distributed catalogues and newsletters over the Internet failed to achieve 100 percent agreement, as did a number of outbound call centres selling products or services over the Internet. To illustrate this, we can cite a company which sells insurance and other financial services from a call centre. Agreement on the coding of this case was below 50 percent. A call centre selling home and travel insurance products and a company selling electronics components over the Internet seemed slightly easier to code but still failed to achieve 75 percent agreement. We will look separately at the 'call centre problem' below.

We can conclude from this that anyone trying to use existing sector-based statistics in order to track the comparative development of *e*Commerce in different Member States is likely to have a hard time.

8.5.6 Wholesale or retail?

As already noted, the development of electronic delivery media has blurred the boundary between wholesale and retail activities, making it possible to cut out middle-men and supply both businesses and individuals by the same means. The development of ICTs has also blurred the boundaries between products for the business market and those for domestic consumption. Perhaps the classic example here is the PC, equally likely to be used for business or leisure purposes. Many of the hard-to-code cases described above in relation to *e*Commerce also offer illustrations of the wholesale/retail problem too. This problem is not a new one for coders; however it seems likely that it has been exacerbated as a result of the widespread introduction of ICTs into companies involved at various stages of the distribution process.

8.6 The call centre: generic activity or an integral part of the parent's activities?

The rapid growth of call centres in Europe has attracted considerable attention from policymakers in recent years, partly because it seems to represent a new type of employment, with a new cluster of opportunities and threats, and partly because of the ease with which it appears to be relocatable offshore. There is therefore a strong interest in accurate information about employment trends in this sphere of activity. For this reason, and because it exemplifies many of the problems identified in classifying the *e*Economy, the STILE partners made sure that a range of cases involving call centres was included in this coding exercise. The cases were selected in order to illustrate as diverse a range as possible in terms of technologies, activities, parent sectors, complexity of functions and relationships with parent or client companies.

Out of 34 cases involving call centres, there was full agreement on the coding between all institutes in only three cases at the two-digit level. Even here, this perfect agreement dissolved at the four-digit level. It is not at all obvious at first sight what these three cases have in common. The first is described as a 'call centre network providing health information'. In our original matrix, this was placed at the extreme right of a five-column spectrum which extended from 'generic call centre' at the left-hand extreme and 'integration into parent activity' at the right. In other words, because of the special skills and knowledge involved in providing health information (where the staff are normally qualified nurses or doctors) we were expecting it to be coded to the health sector. To our surprise, based on the short description, it was consistently coded by all parties at the two-digit level to 74 ('other business activities'). When presented with the long description, two out of the five institutes coded it to 85 ('health and social work), two stuck with 74, and the fifth offered both as alternative options, along with a third choice of 91 ('activities of membership organisations'). The second case was an outsourced call centre providing advice on human resources issues. This produced a consensus on 74 as the correct two-digit category on both the long and short descriptions. Here there was also agreement at

the four-digit level on 74.86 (a new category, 'call centres', introduced in NACE revision 1.1). However one institute was not sure and also offered the alternative of 74.132 (market research and public opinion polling). The third case with full agreement was a call centre handling sales of reproduction rights on an outsourced basis. Here too the consensus was 74 at two digits, with some splintering at the four-digit level into different subcategories.

The idea of coding a call centre to 'other business services' is not so surprising in itself; what is surprising is that only in these three fairly unusual call centres was this choice consistently made. We can only conclude that this apparent consensus is actually the result of a paradox: the category 'other business services' represents a last resort for coders who have been seeking something more exact and have failed. In other words, it is precisely because they were considered hard to code that these three cases ended up in this catch-all category. This would be good news if the other cases had been consistently coded similarly. Alas, they were not. Whether they were inbound or outbound, providing customer support or technical information, selling insurance or travel services, dealing with directory inquiries or processing financial transactions, the only thing that all the other call centres had in common was their propensity to provoke disagreement amongst the coders. After a lengthy comparison of the results with our original hypotheses it was impossible to discern any consistent pattern whatsoever.

It seems that call centres provide a paradigmatic example of the difficulty of classifying activities in the *e*Economy, sitting as they do at the interfaces between businesses and their customers, between products and services and between internal and external processes. In occupying this position, they also expose the differing logics which underlie different aspects of the classification process and the lack of any singly unifying underlying logic. Anatomising the differences in the coding of any given case reveals that in no case have the coders acted irrationally. Each case is multifaceted and they have simply selected which facet to privilege on the basis of differing priorities when reaching their solution. The problem therefore appears to lie in the structure of the classification system itself and the accompanying advice to coders on how to interpret it.

8.6.1 Parent or branch?

Of the cases originally selected to illustrate the range of degrees of separation between an integrated head office activity and a specialised activity carried out in an autonomously-managed distant branch of an organisation not a single one produced total agreement amongst all the participating institutes on either the short or the long descriptions.

The nearest approach to agreement was on the long description of a case involving the data processing of medical insurance claims for the customers of a parent multinational company (whose primary activity was not described). Most coders agreed that it belonged in 72.3, 'data processing', although one institute ascribed it to 74.12 (accounting, bookkeeping and auditing activities; tax consultancy). Based on the short description, however, there was little agreement: only two of the six institutes coding at this level agreed on 72.3. Here, though, the agreement, such as it was, seems to have been based more on an immediate reaction to the term 'data processing' than to any other element of the description. A case which perhaps illustrates more readily the parent/branch dilemma is a post office call centre subsidiary selling financial services. Here, opinion was more or less evenly split on both the long and short descriptions between 64 (post and telecommuni-

cations) and 74 (other business activities), although the degree of certainty was low, with several alternatives being offered. Another fairly clear borderline case was a branch supplying financial transaction services to a parent company in the white goods industry. Here, when confronted with the long description, both the German institutes coded it to the parent industry (29.7 - manufacture of machinery and equipment n.e.c.); whilst all the other institutes coded it to 74 (other business services) or one of its subcategories. However at the two-digit level, there was less agreement, with two institutes coding to 65 (financial intermediation, except insurance and pension funding). There is thus a broad consensus on this case amongst all except the Germans that the branch activity should be coded separately. However (as in other cases involving such services) there is little consensus on how precisely this service should be defined. Could such decisions, multiplied upwards, be the cause of Germany's apparent deficit in business services?

Unfortunately, there is so much conceptual 'noise' surrounding the coding decisions on branches and parents that it is difficult to isolate other cases which illustrate this point. On the basis of this exercise we cannot state conclusively that the parent/branch divide is a critical one in shaping coding decisions. However there is sufficient evidence to suggest that further research on this issue would be productive. It might also be useful to include clear guidelines for NACE coders in this regard, in order to encourage greater consistency in the future.

8.6.2 Independent provider or extension of client?

Closely related to the fuzzy distinction between the activities of a branch and that of its parent is the equally fuzzy distinction (in all aspects except legal ownership) between the activity of a provider of outsourced business services and that of its clients. Here too there are degrees of separation to be taken into account. Some outsourcers are units which are entirely dependent on a single client; indeed they may be former units of the company which have been hived off as separate companies as part of a reorganisation affecting little other than formal ownership. In other cases, the service provider may be a large independent company providing similar business services to many different client companies and with its own strong identity. In between is a sea of confusion. An additional factor may be a longitudinal one. A relationship may be perceived as an outsourcing one when it has been established fairly recently, but as a matter of normal supply when it has existed for a long time. How recently that reorganisation took place may therefore play a part in a coding decision where the unit is known to local coders, which might play a part in further shaping the results.

In the STILE exercise, the division between customer and service provider inevitably overlapped with most of the other distinctions under study (since any company, by definition, is either legally independent or owned by a parent company; and any company providing business services must therefore belong either in the category 'branch' or the category 'outsourced supplier' whilst any company receiving such services must belong either in the category 'parent' or the category 'customer', a very large number of cases fell in practice somewhere along either this continuum or the parent/branch one).

In drawing up the original matrix of cases attention was paid to finding cases which illustrated a range of different 'shades of grey' in relation to the outsourcing dimension. However unfortunately this overlap with other issues made it impossible to determine to

what extent this factor contributed to the level of agreement or disagreement between coders. For instance the case of a provider of customised *e*Learning content on drugs to the pharmaceutical industry provoked considerable disagreement. However the coders' comments suggest that this disagreement was caused more by the problem of multiple activity or the problem of categorising *e*Learning than by the difficulty of deciding whether or not to attribute the case to the customer sector - pharmaceuticals. It was a similar situation with cases involving a software centre supplying the pharmaceuticals industry and an outsourced supplier of media services to software companies. In no case can the considerable level of disagreement between coders be attributed with any certainty to ambiguities about the customer/client relationship.

8.6.3 Conclusion

The main conclusion to be drawn from this analysis is that our original hypotheses greatly overestimated the unanimity of coders in making coding decisions relating to the NACE classification system. Finding a more precise classification of the *e*Economy cannot be achieved simply by improving the instructions to coders in a few borderline cases, as we had originally supposed. The diversity of these results points to the business services sector as a 'can of worms' requiring serious analytical attention if the information economy is to be monitored consistently and benchmarked internationally.

The development of the *e*Economy can be seen as the bringing into visibility of a new phase in the elaboration of the division of labour. This is not a sudden change but the continuation of a process which has been in evolution since at least the first industrial revolution, when it was possible to visualise the economy as simply divided between agriculture, extraction, production, transport, commerce and government. Since then, successive waves of innovation have brought a series of subdivisions as both products and processes have become more complex, requiring many more specialist tasks in co-ordination to bring them to their ultimate consumers. The development of these new products and processes has been accompanied by dynamic changes in the economic activities of organisations, with major implications for how these should be classified.

The basic units which traditionally formed the components of what have been regarded as 'sectors' were normally the 'firm' or 'company', perceived as an organisation producing a single product or service (or closely associated group of products or services) in a relatively simple and unvarying way. The different activities required to produce these were normally co-located on a single site and tightly integrated with each other, and it therefore made sense to ascribe them all to the category into which the end-product was classifiable. As production processes have become more complex, however, not only have new industries grown up to supply their means of production (e.g. to manufacture machine tools or computers) or components (e.g. to manufacture screws or sheets of steel) so also have new service activities been generated, for instance those involved in the design, distribution, marketing, sales or customer services of products, or the tasks associated with the co-ordination and management of these processes or associated activities such as financial administration or training. Whilst these activities remained so specialised as to be associated only with a single product or group of products, it was logical to continue to perceive them as part of the same sector, especially when they continued to be carried out under the same roof or under the ownership of the same company.

However this situation is increasingly unlikely to be the case. There are several reasons for this. One of these is the growth of large companies which cover a number of different product or service groups but which may nevertheless use common departments to service all of them, making it difficult if not impossible to allocate a particular business service activity to a particular product. A second reason is the break-up of organisations into their component parts, making each part of the process into a separate cost centre or profit centre, often located on a different site, perhaps even in a different country, from the location of the parent or the site(s) of production. An even more important reason is the growth of outsourcing. Not only is the activity carried out by an organisation on a different site but also under different ownership. The last two decades have seen an enormous and rapid growth in companies (e.g. Accenture, Microsoft, EDS, Cap Gemini Ernst and Young, Siemens Business Services or Manpower), often many times bigger than their clients, providing a large number of generic business services to a large and diverse group of customers in both the private and public sectors. Not all outsourcing is to large organisations; there has also been a growth of microbusinesses, taking advantage of the relative cheapness and efficiency of the new technologies, also providing outsourced services to both businesses and individual consumers, ranging from website design to database management to accountancy. Many of these companies offer multiple services and flexibly transform themselves in response to changing market circumstances. It was arguably the emergence of these two groups, large and small, which, from the mid-1980s, can be held most responsible for the notion that a new information economy was in formation.

Whether or not it is desirable to classify this information economy, or *e*Economy, or knowledge-based economy, as a separate sector or group of sectors (as opposed to a simple expression of the more complex division of labour in the traditional sectors) is a moot point - a matter which is essentially a decision for policymakers, based on a judgement on the extent to which such a new economy, if nurtured, could contribute to social and economic development. If, as the evidence suggests, it *is* the goal of policymakers to identify this sector in order to monitor and encourage its development, then a change of mindset will be necessary in the design and implementation of industrial classification.

We seem at present to be at a crossroads, caught between opposing logics which reflect differing underlying models of economic development. The approach which seems traditionally to have been strongest in Europe (exemplified in its most extreme form, perhaps, in Germany) has been to attempt to follow the increasingly intricate and elongated progress of each value chain in order to trace back the relationship of each business service to the product to which it relates. Such an approach seems based in a desire to nurture and develop manufacturing industries which are perceived as the main drivers of economic growth. The alternative approach, perhaps currently best exemplified in the United States, is to perceive the business services sectors as relatively autonomous, constituting a source of added value irrespective of the nature of their customers and deserving in their own right of encouragement and support from economic policymakers.

It seems clear that the first approach is no longer adequate to address the sheer size and complexity of the business services sector. However the second runs the risk of ignoring the relationship of these business services to the goods and services produced by their customers. Such thinking, arguably, was one of the underlying contributors to the mentality that led to the 'dot.com bubble' in the late 1990s. The challenge to the designers of industrial classification systems is therefore a complex one: how to balance a definition of

the basic components of the business services and content generation sectors in such a way as to make it possible to track their developments over time and compare them internationally whilst at the same time retaining some sense of their relationship to their customer industries. Only when this dilemma has been resolved will it be possible to construct models which make it possible to quantify their inputs to other sectors and hence the value which is added at each step in the new global value chains which are emerging across national borders. This is in turn a precondition for the development of economic policies at regional, national and international levels which can help bring to fulfilment the ambitious aims of the Lisbon Summit.

8.7 Results - occupations

Because the German national occupational coding system differs considerable from the international ISCO classification scheme, it was decided to exclude Germany from the STILE occupational coding exercise and, instead, to reallocate the resources to a second sector coding exercise, as described above. Occupational coding was therefore carried out in the national statistics offices of Hungary, Ireland, the Netherlands and the UK, in each case by coders who normally carry out coding on their national LFS. This exercise did, however, diverge from their normal practices in some ways: both long and short descriptions were given and in some cases all coding was carried out manually by experienced coders instead of the normal practice, whereby most coding is carried out by interviewers using automated systems based on databases of job titles, with only the more difficult cases being passed on to specialist coders.

If anything, the results of the occupational coding exercise were even more confusing than those of the sector coding experiment. Because only four coding institutes were involved, compared with six in the sector experiment, it would have been reasonable to expect a higher level of agreement. However this was hardly the case. At ISCO major group code (single digit) level, only 40 cases out of 157 (just over a quarter) were coded similarly in all four countries, at submajor (two digit) level this fell to 26 cases (16.5 percent) and at a minor group code (three digit) level it dropped to 15, less than ten percent. It was difficult to discern consistent patterns in the disagreements.

8.8 Conclusions

The exercise confirmed an impression that job titles or short descriptions drawn from job advertisements do not provide a good basis for consistent classification. Coders inevitably draw on their experience of previous coding activities which have told them that employees cannot always recall accurately the name of their position within the company and quite frequently similar titles denote very different occupations. In some countries they are used to probing beyond the basic information first offered and are frustrated when they cannot elicit additional information. This problem is compounded by the use of vague but fashionable words like 'manager', 'adviser' or 'co-ordinator' which are sometimes employed to give spurious status to what may in reality be rather low-level jobs.

As when coding sectors, coders showed a strong tendency when confronted with a 'new' occupation to avoid wherever possible newer catch-all classification categories in

favour of the nearest match they could find with a traditional occupational category. For instance a telesales agent in a call centre was likely to be viewed, first and foremost, as a salesperson and the newer category 'call centre operative' to be ignored.

With the decline in traditional, clearly-demarcated occupations, it seems to be becoming increasingly necessary when coding occupations - whether as part of institutional or non-institutional surveys - to obtain a detailed job description and develop systematic practices for probing beyond the job title. This is particularly the case when coding 'new' occupations. Technical or proprietary terms used in job advertisements, such as 'ICQ coordinator', 'ERP specialist' or 'SSC director' give no clues to the complexity or the innovative nature of a job, or to the depth of knowledge it requires.

Extra information that would be desirable includes a clear indication of the most important component of the job description. In the case of multiple activities, the dominant one needs to be emphasised. Also desirable is information on the level of independence of the work, the required educational level, including special training and the responsibility taken with the job. Indications on how, how often and for which tasks a computer is used, and the expertise that is needed for the use of IT as well as the experience required are more important in describing software-linked activities than the names of software packages, which are likely to become obsolete by the time of coding, let alone during the lifetime of a classification system.

There are, however, several practical obstacles to adopting such an approach, especially where automated or semi-automated systems are used, with limits on field size and designed to be used by interviewers. It is, nevertheless, in the design of more intelligent automated systems that some practical solutions may be found in the future. Already, several countries, including the Netherlands and the UK, include software features which prompt interviewers with supplementary questions until a satisfactory coding solution is achieved. So far, however, no systematic attempts have been made to pool these questions, or the national job title databases to which they are linked, at an international level.

A useful aid to such a process would be the establishment of 'standard formatted typical questions', with concrete norms to describe an occupation, the required competences and the use of ICT. It might also be useful to investigate whether the way ICT is used within an occupation can be distinguished by adding an extra digit in the code range. Such information could be added to some of the other parameters already present in national classification systems, among them for example the sector of the firm, the most important tasks and the level of responsibility. The results of this study point to the need to enlarge these lists of add-in parameters and related questions as a means of improving the quality and comparability of occupational coding. Without such an improvement, it seems unlikely that it will be possible to monitor progress towards a knowledge-based economy adequately even at a national level, let alone develop effective means to carry out comparisons internationally.

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9 Occupational profiling in the Information Society

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Abstract

The article contains a reflection on occupational profiling, taking explicitly into account both the content-related and control-related dimension of occupations. Those two dimensions are elaborated and illustrated on the basis of evidence from empirical data. First of all, outcomes of surveys among employees and their employers are shown to illustrate the impact of developments in society on work and competencies of different occupational categories. Secondly, the role played by major actors is shown in constructing occupational profiles as a basis on which VET qualifications ought to be formulated and filled out. It is stated that occupational profiling appears to be more than merely a methodical-technical category related to contents, but a methodological-normative category related to social constructing too.

9.1 Introduction

The issue of occupational profiling is important both for understanding restructuring processes in work and labour markets and for gaining insights into the changing relationships between work and learning. Information and communication technologies (ICTs) supply the essential underpinnings of the Information Society and now cut across all branches and national boundaries. As a consequence, both work processes and the labour market are undergoing fundamental changes too, and so are concepts about learning for and in work. How can these changes be assessed from the point of view of occupational profiling?

9.1.1 Occupations: contents and control

Occupations traditionally constitute important institutionalised anchor points on the labour market, which transcend the individual. In principle, they offer employers important cornerstones both for structuring and allocating jobs and for recruiting new staff. They also play this role for current and future employees in educational, training and vocational guidance processes, as well as for vocational education and training (VET) schools in qualifying students.

Due to developments in post-industrial society, especially the development of an Information Society, it is often supposed that occupations as traditionally defined are becoming less meaningful. The future can often be predicted only afterwards, and so it is with predictions about the future of occupations.

Nevertheless it should be noted that the viability of the 'occupation' concept in work and on the labour market depends on at least two major interrelated dimensions, one referring to the content of the work and the other to control.

Occupations can be conceptualised as dynamic structures which in essence are characterised by a specific clustering of knowledge, skills and competences with certain company-transcendent market values. The dynamic dimensions result firstly from changes both in the nature of competences and in the societal demand for products and services. Secondly, changes result from changes in the forces that control the market value of these clusters of knowledge, skills and competences (cf. Geurts, 1989). As a consequence, in order to understand the meaning of occupations in a changing society where ICTs are affecting not only work processes but also the boundaries of traditional sectors and occupations, both dimensions - the one relating to job content and the one relating to control - need to be taken into account.

9.1.2 Occupational profiling

In a changing society, the issue of occupational profiling can be considered from both a conceptual-empirical and a methodological point of view. Firstly, occupational profiling can be looked on as a consequence of more or less autonomous developments in work and on the labour market. Accordingly this issue is important for understanding (re-)structuring processes in the labour market as well as the concept of 'occupation' itself. Secondly, occupational profiling refers to the construction of 'occupational profiles' with the aim of optimising the processes of matching vocational training with work practices. As such, responding to the issue of occupational profiling is a methodological issue too. In other words, the issue of occupational profiling points to the consequences of developments in work and on the labour market both from a conceptual-empirical and a methodological point of view.

Starting from key developments in society and in work processes, this paper is a reflection on occupational profiling, taking into account both the content-related and control dimensions of occupations.

9.2 Key developments in society

Most of our societies are expected to develop from industry-based economies into knowledge-based ones. Knowledge appears to be becoming the new basic resource in economies, where knowledge productivity produces more added value than traditional factors like capital, raw materials or physical labour. Scientists like Drucker, Giddens and Castells offer many reasons why the traditional economy of physical goods, capital and labour will be replaced by a knowledge-based economy, in which elements of the *e*Economy are rather essential. Meanwhile the meaning of 'knowledge' is changing too.

A growing service sector, the decreasing contribution of physical labour, accelerating processes of collective engineering, and the ICTs that are present everywhere, are some of the indicators of the increasing importance of knowledge, especially applied knowledge. In post-industrial society, knowledge-based developments from an economic point of view appear to go hand in hand with some key developments from a sociological point of view. In other words, developments of an economic and sociological nature are in close interaction with each other, resulting in fundamental consequences both for work processes and labour markets as well as for the nature of the relationship between work and learning.

9.2.1 Key developments in the 21st century

Following Schnabel, director of the Dutch Social and Cultural Planning office (SCP), five key developments can be distinguished from a sociological point of view which will determine the character of the 21st century. He calls them the five 'big Is' (Schnabel, 2000):

- *internationalisation*, which is physically symbolised both by processes of tourism and of migration. Internationalisation is closely linked with economic liberalisation and globalisation;
- *individualisation*, which is the ongoing process both of decreasing dependency of the individual on one or several people in his or her direct environment, and of increasing freedom to shape one's own life. This does not mean that there is not a need for common experiences and regulations; on the contrary, collective experiences and regulations are desired, insofar as these are at the service of the individual;
- *informalisation*, which is a form of de-institutionalising organisations and ways of organising things, as these developed in the 19th century and the first half of the 20th century. Organisations in the 21st century will become flatter, and will more and more acquire the character of networks, which in many respects are of a virtual nature. Individualisation and informalisation fit together well and are reinforced by processes of informatisation;
- *informatisation*, which is a term coined to describe the way that technological developments will increasingly acquire an open informatised nature. The meaning of information will change, with a suitable selection of information becoming more important than its availability. This will also have tremendous consequences for the meaning of knowledge and the role of learning;
- *intensification*, refers to the changing dynamics and increasing role of experiences in modern life. Experiences of work, relationships and life are being influenced more and more by the desire to intensify feelings and experiences.

In the context of these five 'big Is' and their consequences, fundamental changes occur both in work processes and on the labour market as well as in the relationship between learning and work.

9.2.2 Changes in work processes

Empirical research during the last decade does indeed show fundamental changes in work processes and on the labour market. A range of developments in the context of work appears to have impacted on work content in quite specifically interrelated ways.

This can be illustrated from the results of one of our surveys in which employers and employees from the same companies were questioned. Two-thirds of all employers appear to perceive the context in which they are functioning as rather dynamic or even turbulent, and so do most of their employees.

Table 9.1 gives a more detailed impression of these results, based on information from the employers in this survey. It shows statistically significant correlations between developments in the context on the one hand and changed work content on the other.

Table 9.1 The relationship between changes in work context and work content

Developments in the context of work: main dimensions	Changed work content
- *Internal organisation and culture of the company:* a.o. flatter organisation, flexibilising working hours, cultural changes	- More flexible employability - Enhanced complexity - Enhanced responsibility - Less fixed working place - Broadening of tasks - Less routine work
- *Technology:* a.o. ICT developments, computerisation, new machines/equipment, changed way of working	- Enhanced specialisation - Enhanced complexity - Increased use of modern equipment - Broadening tasks
- *Laws and giving rules:* a.o. introduction of quality-care-systems	- More time pressure - Enhanced protocolling
- *Consumers markets:* a.o. internationalisation, new products/services, new markets	- Enhanced teamwork - More flexible employability
- *Labour market:* a.o. quantitative relationship between demand and supply, composition labour force	(No significant correlation with work content)
- *Society and politics:* a.o. changing societal needs, e.g. policy options, co-arrangements with other firms	- Enhanced complexity - More time-pressure - More flexible employability - Less fixed working place - More solo performances

Source: Hövels & den Boer, 2001

Clearly, those correlations are of a statistical nature. Developments in the context of work are crystallising themselves in specific constellations within individual firms, whilst notions of organisational, technological and qualificational choice are playing a role too. In-depth studies will be required to unravel more precisely the variety of processes and mechanisms that underlie these developments. In particular, such qualitative studies will be necessary to identify the consequences for different types of jobs and employees.

Nevertheless, the next section will illustrate at least the meaning of these developments for certain occupational categories in terms of occupational profiling or de-profiling on the basis of the more quantitative evidence that can be derived from empirical survey data.

9.3 Shifts in content: towards both broadening and specialisation

Focussing on occupational categories, in this section we present some more empirical evidence from our research into the impact of changes in work and work organisation on the content of work, on the competences which are required and on learning.

The abovementioned survey focused on six quite different occupational groups: mechanical engineers, carpenters, police officers, nurses, accountants and multimedia

workers. It was conducted among nearly 1,200 employees and 300 employers for whom they were working. The results suggest that major changes had occurred in the nature of their work during the past five years.

Complexity is shown to be a common term with which to label changes in the content of work, meaning - in practice - various combinations of the broadening of tasks, increasing specialisation, and increasing responsibility at work (den Boer & Hövels, 1999). The combined effects in terms of both broadening and specialisation deserve special note. For many occupational practices an increasing specialisation in terms of the content of the work has gone hand in hand with a broadening process. The greatest changes take place in work content within occupational practices when both of these processes take place simultaneously. The data indicate that it is, in consequence, employees in these work practices who are most frequently required to develop their competences.

Despite these overall tendencies, it should be stressed that differences exist both *between* various occupational categories and *within* these occupational categories (in this case between firms). The occupational practices of carpenters, for example, are less affected than those of police officers or multi-media workers by changes in the contexts of their firms or in the nature of the work itself.

Depending on the pace, the intensity and the predictability of developments, a distinction was made between *static, dynamic* and *turbulent* contexts. Table 9.2 shows the differences in managers' perceptions of this context between the six occupational groups.

Table 9.2 Perceptions (according to employers) of the context of different occupational groups: percentages

Context	Mechanical engineers	Carpenters	Police officers	Nurses	Accountants	Multimedia workers
Static	19	30	7	16	18	-
Dynamic	65	62	64	65	73	73
Turbulent	17	8	29	19	10	27

Source: den Boer & Hövels, 1999

9.3.1 Shifts in areas of competence

It is evident that the character of changes in competences varies across the different occupational categories.

Leaving aside the changes in separate competences as perceived by the employees themselves (and even more strongly by their employers), we focus here on various areas of competences, distinguishing between:

- professional-technical versus non-technical areas (such as social and communicative competencies and flexibility);
- specialist versus generalist areas (such as competences in a rather broadly defined domain);
- areas of one's own profession versus areas of other more or less closely-related professions;

- firm-specific versus firm-transcendent areas (i.e. competences which are valuable in a wide range of different firms).

Table 9.3 shows the answers provided by the occupational groups that are predominantly in dynamic or turbulent contexts to the question whether they had perceived shifts in the relative emphasis on the breadth-specialisation dimension of competences during the past five years.

Table 9.3 Broadening and/or specialisation (according to employers) for occupational groups in the most dynamic or turbulent contexts, percentages

	Police officers	Nurses	Multimedia workers
No specialisation, no broadening	16	3	8
Specialisation, no broadening	10	16	14
No specialisation, broadening	51	16	8
Both specialisation and broadening	23	65	69

Source: Hövels & den Boer, 2001

Clearly, large differences exist between police officers on the one hand and nurses and multimedia workers on the other. Police officers appear to stress only broadening tendencies in their work, while amongst nurses and multimedia workers the combination of specialisation and broadening tendencies is dominant.

It is especially interesting to note that police officers are much more likely to stress the increased importance both of non-professional areas of competence and of general areas, whilst nurses are much more likely to stress the increased importance both of specialist competence areas and of competence areas from other, related professions. Multimedia workers can be found between these two positions.

9.3.2 Dynamic perspectives and firm-transcendency

It can be concluded that developments in work seem predominantly to affect both the typical professional or occupational content of work and competence areas. At the same time, the impact of dynamic or turbulent developments on work appears to provide strong empirical evidence to support the statement that in post-industrial society dominant shifts towards the strengthening of typical professional or occupational contents should principally be interpreted not from a traditional static perspective but from a perspective of dynamic occupations.

It should be noted that variations were observed not only between but also within occupational groups related to the content of occupational practice. Typical firm-specific influences appeared to be dominant in a substantial number of cases affecting all the occupational groups, albeit in some groups more strongly than in others. Evidently, the firm-specific or firm-transcendent nature of changes in work content is an extremely important dimension of the issue of occupational profiling.

Table 9.4 shows the extent to which occupational groups that have been confronted most strongly with dynamic or turbulent context developments differ in the firm-specific or firm-transcendent competence areas which are required in their work practice.

Table 9.4 Required firm-specific or firm-transcendent competence areas (according to employees) for the occupational groups in the most dynamic or turbulent contexts, percentages

Competence areas	Police officers	Nurses	Multimedia workers
Mostly firm-specific	59	24	8
Partly firm-specific, partly firm-transcendent	36	26	40
Mostly firm-transcendent	5	51	52

Source: Hövels & den Boer, 2001

It can clearly be seen that comparisons between those occupational groups show large differences between police officers on the one hand and nurses and multimedia workers on the other. Changes in the work of the two latter groups are far more likely to be dominated by firm-transcendency.

Although classic tensions between professions/occupations and work organisation still play an important role, changes in work content for police officers point to more firm-specificity, whilst those for both nurses and multimedia workers appear to be more firm-transcendent.

9.3.3 Diversity of developments and the impact of ICT

Re-analyses of the data also show that the turbulent, dynamic or static nature of the contexts of work processes depend on their diversity rather than on the nature of developments (den Boer & Hövels, 2002). One striking finding is that whereas both social and political developments as well as developments in consumer markets have impacts in terms of broadening the content of work, technological developments appear to be the only factor which correlates statistically with specialisation in work processes. However the role of technological development appears to be a rather ambivalent one. On the one hand it is connected with both specialisation tendencies and professional-technical competences; on the other, ICT goes hand in hand with broadening tendencies articulating the significance of non-technical competences. It will be necessary to carry out more in-depth studies into the role of technology/ICT, especially to obtain more definite answers to the question how far and under what circumstances technological change contributes to the occupational structuring of work processes.

9.3.4 Work and learning: differences in the views of employees and employers

Another important result from this analysis is that the points of view of employees and their employers on both work and learning do not always appear to be similar.

In response to questions about the competences which are required in work, the survey results from employees and from their employers shows some striking differences in their perceptions of reality (Hövels & den Boer, 2001). Employers are much more likely than their employees to stress general shifts in required competences towards non-technical, generalist, other professional, and firm-independent competences. An additional survey into the care sector confirms that the frames of reference of employers and employees differ in assessing the match between those competences which are required and those which are available (Hövels & den Boer, 2001). The frame of reference used by employers is oriented both towards the functioning of the work organisation as a whole and towards future developments as they see them. The frame of reference used by employees is much more determined by their present, concrete, working situation and their own functioning, as well as that of the team in which they work.

The same tendency appears in relation to learning motives. Employers are more likely to stress the need for improvement in non-technical competences, improvement in productivity and ties to the firm, while employees are more likely to stress their career opportunities.

Clearly, in the employees' views, occupational content is more central whilst according to their employers' views, flexible dovetailing into the firm is the most important goal.

9.3.5 Conclusions

First of all it seems clear that major changes are occurring both in the nature of contemporary work and in the competences which are required. Discussions about drastic changes in our post-industrial society do, in other words, seem to have roots in reality; perhaps it could even be stated that change is one of the few stable features. Empirical evidence related to the content of work and learning shows at least two kinds of development. The first - and most striking - is that recent changes in work appear to affect the typical occupational content of work. The nature of work appears to have changed drastically, in a manner that can be characterised essentially as increasing complexity by combining both broadening and specialisation tendencies. As a consequence, dominant shifts under post-industrial conditions should be interpreted not from a traditional static perspective but from the perspective of dynamic occupations.

Secondly, it appears also from empirical evidence that both the extent and the nature of change vary greatly between different sectors of the labour market; it is at least clear that considerable variations exist between different occupational categories.

Focussing on those occupational groups in our survey which are most often affected by dynamic or turbulent contexts, it is interesting to show as an example some major differences between three occupational groups: the police officer, as an example of a traditional occupation; the nurse, as another example of a traditional occupation; and the multimedia worker as an example of a new 'cluster of knowledge, skills and competences' which has arisen with the Information Society. Although all three groups are affected by a dynamic or turbulent context, the work content of police officers show both broadening tendencies and an increase in firm-specific tendencies, while for both nurses and multimedia workers a combination of broadening and specialisation tendencies can be observed. The work of nurses, in particular, is also strongly affected by competence areas from other - related - professions.

Interpreting this outcome, referring only to the work content, it could be stated as a hypothesis that under the influence of social and political developments, the traditional occupation of a police officer is being undermined or hollowed out, whereas the cluster of knowledge, skills and competences around multimedia workers could perhaps be developing into an 'occupation'. Nurses seem to be maintaining their traditional status as an occupation, responding in an occupation-wide way to contextual developments, among other means by integrating into their work contexts competences from other related professions. (In the next section we will illustrate the role played by the control dimension in the shaping or renewal of occupations.)

Thirdly, and no less importantly, the interpretation of changes in terms of consequences, i.e. what they mean, appears to vary, depending on the actor's position. Employees and employers, for example, give different meanings to the kinds of competences and changes in these competences that are required in their work. In other words, post-industrial circumstances may be characterised both by diversification and by heterogeneity in the way key actors define the situation. Employers in general stress much more than their employees the shifts in required competences towards non-technical, generalist, 'other professional' and firm-independent competences. As a consequence it appears that there are major differences in content in the general frames of references used by employers and employees in assessing the impact of post-industrial developments on competences and the consequent challenges for learning. The frame of reference used by employers is oriented towards both the functioning of their work organisation as a whole and on future developments as they see these. By contrast, the frame of reference used by employees is much more determined by their present, concrete working situation, their own functioning in it, the functioning of their own day-to-day working team and their occupational career. Typically, professional-technical aspects are predominant in the employees' frame of reference.

Finally - and this is of relevance both for policy development and for future research - it can be generally concluded that at least two concepts play a central role: a *dynamic concept of occupations*, which fits in with the character of post-industrial society; and the insight that competences and occupations are essentially a *social construct*, interpreted and shaped by the major actors involved.

9.4 Occupational profiling: the interrelationship of content and control

With regard to the controlling dimension of the occupational concept, the role of institutional actors is crucial in the process of occupational shaping.

9.4.1 New work areas: occupational profiling

Although examples are known where purely ideological and/or proactive labour market considerations have been dominant in launching processes of occupational shaping, most of the origins of new occupations can be found in the rise of new areas of work. In other words, as a consequence of the way in which individual companies, whether acting alone or in co-operation with other companies, are responding to changes in their environment by creating new activities or rearranging existing ones, new clusters of knowledge, skills and competences are launched. These new clusters can be crystallised into specific jobs or

departments to a greater or lesser extent depending on the organisational strategies of companies.

Occupational shaping can be regarded as a process by which these clusters of knowledge, skills and competences are becoming more or less institutionalised at a company-transcendent level, e.g. by using them as the basis for constructing competence standards in qualificational and training trajectories, by organising more or less strong occupational groups across various companies around clusters, through the formulation of ethical and/or procedural codes by these groups, by all kinds of support from government, and by other means. In principle, traditional occupations may be undermined, hollowed out or renewed by the same kinds of mechanisms (cf. Hövels, 1999).

Clearly, the controlling dimension of occupations is determined on a level playing-field of various institutional actors, who share, to differing degrees, interests in further institutionalising clusters of knowledge, skills and competences: employers; employers organisations, organisations of employees; trade unions; educational institutes; government bodies, etc. Occupational shaping is also the outcome of influential forces on this level playing-field. Especially in relation to new work areas, such as those related to the use of ICT, which cut across the borders between existing branches and occupations, it can be supposed that traditional demarcations are mobilising rather strong forces on this level playing-field. Depending on the strength and strategies of various institutional actors, new clusters will be more or less institutionalised. In addition, of course, level playing-fields are changing all the time and this is reflected in the way that the controlling dimension of occupations is a dynamic one too.

Changes in both the content and the controlling dimension are strongly interrelated. In a process of mutual interaction, they define the outcome of processes of occupational shaping in practice. Both changing content and controlling forces demarcate the arena in which innovative developments towards new occupations and renewal and the undermining of existing occupations may be launched.

An illustration from the Dutch situation: qualification structure, qualifications and occupational profiles

The existence of recognised qualifications and training courses is one of the major pillars supporting occupations. At the same time qualificational and training trajectories are supposed to be based on occupational profiles. In other words, both training trajectories and occupational profiles are strongly interrelated. Therefore it is interesting to show as an illustration the role of control by institutional actors in occupational shaping or renewal.

In the Netherlands, national qualification standards for initial vocational education and training at secondary level are defined at two levels of aggregation. Firstly, they are defined at the level of the entity of a qualification, based more or less on the occupational structure in the labour market. The totality of qualifications shapes a qualification structure. The second level of aggregation implies the filling out of these entities with content. This occurs more or less on the basis of occupational profiles and results in attainment targets for each qualification. Qualifications including attainment targets contain the standards for obtaining diplomas or certificates. Evidently the qualification structure and the qualifications themselves as well as the occupational profiles are social constructs:

they have been constructed by actors in society on the basis of criteria which are defined by both the positions and the interests of influential stakeholders and their interrelationships.

9.4.2 The role of various actors

To clarify the role of various actors in this construction process, it should be explained that the social partners, - i.e. representatives of both employers' organisations and trade unions - are responsible for defining in the labour market both the relevant occupations and the accompanying occupational profiles. Representatives from the educational field and the social partners meet each other formally within the national bodies for vocational education and training (nowadays referred to as 'knowledge centres for VET and trade/industry'). The purpose of these meetings is to define qualifications and flesh out their details, taking these occupations and occupational profiles as a point of departure. These deliberations take place in the context of a programme of requirements laid down by the Dutch government (the Ministry of Education, Culture and Sciences) to guarantee that qualifications will meet some main outcome criteria for initial VET, e.g. requirements in terms of a three-fold qualification (labour market, citizenship and further learning components), breadth, future-orientation, etc.

Clearly, national bodies have a key role to play, both in defining the labour market entities (i.e. occupational entities) on the basis of which qualifications are defined as well as in 'filling out' qualifications with attainment goals. The underlying idea is that national bodies representing both the labour market and the educational field can bring about a situation whereby individual qualifications as well as the qualification structure as a whole can guarantee an optimum in matching between the labour market and the VET at a national level.

9.4.3 National bodies for VET

National bodies are mostly organised on the basis of economic sectors or branches, e.g. the building industry, the care or welfare sector, the technical sector (for instance, the metallurgic, installation or electronic sectors), agriculture, the processing industry, trade, etc. However some of the national bodies are organised according to occupational sectors, for instance, economic-administrative occupations.

Both the social partners and the educational providers for each sector are represented on the boards of these national bodies. In principle, the national bodies have a statutory remit to function as interfaces at the national sectoral/branch level between the labour market/work and the VET/learning system. At the time of writing, 19 such national bodies exist and are supposed to supply the entire spectrum of the labour market for upper secondary VET with qualifications.

To understand the position of these national bodies in an appropriate way it is important to be aware of their historical role, which has evolved from the branch-level bodies which oversaw the former Dutch apprenticeship system. As such they held very strong ties both with firms and with the (organised) social partners in the various economic sectors and branches. However under new legislation, enacted in 1996, their remit was broadened, to include not only the traditional apprenticeship system but also the school-

based route to learning. The assumption embodied in the new legislation is that qualifying someone should be independent of his/her learning route, and therefore both dual-based and school-based learning routes should lead to the same or at least comparable attainment targets, and hence the same qualifications.

Against this background, national bodies were given the responsibility for establishing and updating the qualifications for the whole secondary VET system, including both dual and school-based learning routes. Even more importantly, from the point of view of the subject of this paper, in defining both qualifications and attainment targets they were to take more or less as a point of departure those working domains which were also their traditional areas before the legislation of 1996. So from an historical point of view these national bodies have their roots in the former apprenticeship system and are strongly connected with areas (sectors or branches) which are demarcated by the traditional domains of the organised social partners.

To put this the other way around, the social partners, organised along traditional employment areas feel themselves strongly connected with 'their' national bodies. In some cases, these national bodies do not only carry out their statutory tasks of establishing and updating qualifications but also function as the central supplying body for all the training provision in a particular sector or branch.

Towards a sustainable and transparent qualification structure

Students in initial VET should be prepared both for individual flexibility and for lifelong learning, taking into account developments in internal and external labour markets. This presupposes at least a qualification structure as well as qualifications which are sustainable, broad, oriented to the future and transparent.

As a consequence both the character and the functioning of the national qualification structure are currently under strong pressure. This has led to proposals to strengthen the VET system, with the aim of making the qualification structure more competence-based, and, by building broader qualifications, reducing the total number of qualifications (from more than 700 now, towards about 300 at a maximum) and creating greater transparency.

9.4.4 The sector-bound/cross-sectoral dilemma

One major problem has to be highlighted in this context. It consists of what we call the *sector-bound - cross-sectoral dilemma.* This dilemma points to the rather strictly demarcated working areas of the existing national bodies vis-à-vis the general cross-sectoral developments taking place in work and on the labour market, which are growing in importance both quantitatively and qualitatively. It is the increasing attractiveness for students of cross-sectoral competence areas which is sharpening this dilemma even further. Here of course the autonomy of the separate national bodies and their traditional areas of work are also affected. Pressures are put on the national bodies to co-operate in defining and elaborating the content of qualifications as well as to ensure transparency in the qualification structure as a whole. Pressure is thus being brought to bear on the national bodies both by the dynamics of the labour market - which are becoming more and more visible in intersectoral developments - and by the political urgency to strengthen the national qualification structure by making it more transparent, more durable and broader, based

on transferable competences. This has stimulated the national bodies to launch discussions and initiatives to co-operate with each other. Apart from the current trend towards defining both qualifications and occupational profiles in terms of competences, the system is also confronted with some other problems.

9.4.5 Major issues

Among the most important questions in the discussions between the national bodies on co-operation in relation to intersectoral developments on the labour market are:
- On the basis of which criteria should new qualifications be defined in mutual co-operation?
- When are new clusters of competences in the labour market significant enough to be ready for definition as the basis for a qualification?
- How exactly should the new qualification be circumscribed and 'filled out' with contents?
- Which occupational concepts should form the basis of this qualification?

One concrete example is the co-operation in the field of IT, where three national bodies have jointly succeeded in realising IT qualifications which form the common responsibility of all three national bodies: the national body for economic and administrative affairs; the national body for electronic affairs; and the national body for the printing industry. Before this development, separate and quite different IT qualifications existed in the technical sphere, in the economic-administrative sphere and in the printing sphere.

However, there appear to be some structural problems in the shaping of effective co-operation. One of our research projects found that a major problem in the co-operation between different national bodies is the fact that many of them are structurally strongly embedded in the system of industrial relationships as a whole (Kraayvanger, Eggert & Hövels, 2002). The policies of the national bodies are strongly shaped by the traditional forms of organisation of the social partners, their branches and the arrangements which apply in their sectors. For example, in the case of IT qualifications, in one branch the social partners had traditionally subsidised traineeships through their training fund, but this was not the case in other branches. There are many other such differences in the arrangements between traditional branches. Here the central question seems to be one of ownership and vested interests, not only related to the new qualifications themselves, but even more so related to the domain in which they are defined.

9.4.6 Conclusions

As illustrated above, the role of institutional actors in shaping qualifications and training trajectories appears to be evident, with the traditional vested interests and the spheres of the actors playing an important role. The same applies in the case of the underlying concepts related both to the demarcation of 'occupational' areas and the elaboration of the contents (tasks, competences, etc.) of these to construct occupational profiles. In the case of this Dutch example, the social partners at the branch level play a dominant role.

One of our main conclusions from the research was that in order to guarantee an effective co-operation across the sectoral divide, the social partners themselves in the different

branches should in their training policies address serious efforts to breaking down the partitions between their branches. In other words, there is a risk of conservatism because of the strong ties between the national bodies and the traditional organisation of the social partners for each branch, leading to a situation whereby the relevant intersectoral developments are not sufficiently covered in the qualification structure.

Co-operation is continuing, but is still in development. The main question is how to break down the institutional barriers between branches in order to develop an institutional substratum which is appropriate for constructing and updating a truly competence-based and dynamic qualification structure. Vested interests still play a major role in the qualification development process. This raises the question of how to define and demarcate appropriate labour market entities such as occupational profiles, as well as how to elaborate their contents in a way that can respond adequately both to developments in work processes and to changes on the labour market.

9.5 Conclusions and perspectives

As we hope to have demonstrated in this paper, the emergence of new occupations and the renewal or undermining of existing ones, are related both to developments in work content and to shifts in the relations between institutional actors. Occupational profiling appears to be more than merely a methodical-technical category; it is also a methodological-normative category.

9.5.1 Construction of occupational profiles

From this point of view, the processes that shape occupations and the construction of occupational profiles are strongly interrelated. Certainly, in the context of cross-sectoral developments in work and on the labour market, the demarcation of an occupational area and the elaboration of the tasks and competences involved in it are both essential. Occupational profiles should in other words not be considered as a *'deus ex machina'*. Here, the interplay between different institutional actors is an important shaping factor. In addition to variations between national institutional contexts, from an international point of view different societal effects will also come into play.

Different concepts of competences may be used, e.g. depending on the definition of competence (or competency), a definition which seems to be closely related to specific societal and national contexts (cf. Winterton & Delamare-Le Deist, 2004). Although various institutional actors are involved in defining and elaborating occupational shaping, it should be noted that the social partners and other public or national institutions are by no means the only actors shaping the frames of references and definitions of occupational profiles. An important role is also played by consultants (cf. Oates, 2004).

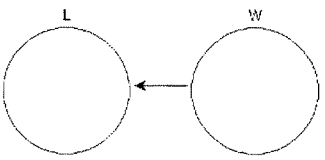
The relationship between learning and work

The developments discussed above are changing the traditional functions of knowledge and educational institutions, both in relation to content (*what* to learn) and to learning processes themselves (*how* to learn). They do so while interacting closely with features of the knowledge economy.

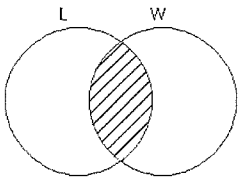
The rapidly accelerating creation and circulation of knowledge, the increasing role of tacit knowledge, and changes in the required competencies towards both broadening and specialisation are forcing schools to occupy themselves less exclusively with the passive transfer of knowledge. The quality of passive processes of knowledge transfer seems to be decreasing in terms of both actuality and applicability. As a consequence, schools are partly losing their strict monopoly position relating to knowledge transfer, and acquiring new roles: more facilitation and stimulation of learning processes towards the identification and acquisition of the key features of occupations and work.

These changes can be conceptualised in terms of the relationship between learning systems and work systems. The main trend can be interpreted as a paradigm change from one-sided, disconnected approaches towards both integrative and network approaches.

From *disconnected models*:

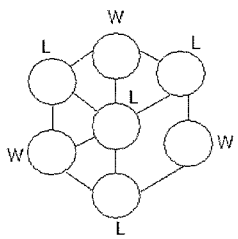


Towards *integrative models*:



and/or

network models:



Disconnected models are the familiar traditional ones. Here the learning system is supposed to be located almost entirely within general and vocational schools, and the work system requires schools to provide a suitable supply of human resources to fit the jobs. Disconnected approaches to the relationship between the learning system and the work system essentially have the character of a planning model: both qualitative and quantitative aspects of the contents and shaping of learning are planned on the basis of actual or

perceived developments in work. It can be argued that this model will become increasingly obsolete, since it no longer responds to fundamental changes in the relationship between learning and work.

Alternative models which are more appropriate to these changes are emerging rapidly. In particular, the existing demarcations between initial learning for work and post-initial learning seem to be changing and are even partially vanishing. As a consequence, the alternative models are not intended exclusively for initial or post-initial segments of the learning systems. Among these alternative models, we can initially distinguish between so-called integrative and network models (Hövels & den Boer, 2001).

Both integrative and network models stress the role of formal or informal networks of educational/training, work and other kinds of environments where people can develop their competences. In this context, some authors even speak of 'travellers in knowledge', and others of 'the network society'. In this context, concepts like integrative and network learning are also of relevance, as well as how the organisation of work - at the level of firms - is connected with the organisation of learning.

Both integrative and network models have meaning not only at the level of individuals/individual learning, but also at an institutional level. Evidently, the change in paradigms will also have consequences for the positioning or repositioning of important institutional actors - both public and private - on the playing field of learning and work, such as educational institutions, work organisations, employment services, etc.

From the point of view of the relationship between work and learning, both the shaping process of occupations and the construction of occupational profiles can also be situated in this paradigm shift.

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10 New occupations in a new economic environment: European similarities and differences

AN BOLLEN / MONIQUE RAMIOUL

Abstract

This paper results from a study of the STILE project that focused particularly on skills and occupations.

As part of this work, the project explored a number of methods for gaining insight into characteristics and trends on the labour market with the aim of addressing policy concerns. A starting point was the recognition that policymakers need updated indicators to measure progress towards the goals of economic growth, optimal employment, equal opportunities to access the labour market and thus participation of all citizens in a highly turbulent and globalised society..

Policymakers at various levels develop measures for closing the gap between the competences that are needed to perform jobs and those competences that employees already possess. At the macro level (supranational and national) policymakers stimulate education, labour market mobility and competence development in a more informal way (learning at the workplace). At the meso-level available information on occupations assists students in making choices. At this level, educational institutions and training centres fine-tune programmes to the competence needs of industries. At the micro level, companies develop an assessment policy and, related to this, an employee training policy to fine-tune employees' competences to the requirements that are related to the work.

All these measures are based on insights into the nature of tasks and the competence requirements that are needed to perform these tasks. The STILE project focused attention on occupational profiling as a method for gaining insight into the demand side of the labour market. In the study on occupational profiling the focus was threefold. First, the consortium wanted to assess existing occupational profiling methods on their feasibility for profiling new occupations in a new and international environment. Second, they wanted to provide insights into the characteristics of new occupations, more specifically of ICT occupations. Third, the international character of the research allowed the consortium to give an initial impetus to international comparisons of profiles, formulating methodological recommendations for comparison and inspiring future research questions.

This paper addresses these three goals. Starting with a general description of the characteristics of new occupations, the paper discusses how these challenge existing occupational profiling methods. On the basis of the STILE research experiences it formulates some important recommendations for profiling new occupations in the New Economy. As the international perspective is becoming more important, special attention is paid to recommendations for profiling occupations in an international comparative perspective and for formulating research questions that need special attention in future research.

10.1 Important characteristics of the 'New Economy'

Before elaborating on the characteristics of new occupations in the New Economy, it is important to discuss some key characteristics of the New Economy. Three trends need special attention in this context: first, the emergence and diffusion of information and communication technologies; second, the increasing importance of knowledge as a production factor; and third, the organisational changes that are forced by the changing socio-economic environment. These three trends mutually affect each other.

10.1.1 Penetration of ICT

New technologies for information and communication have penetrated the professional and private life of nearly every citizen. The introduction of the new technologies has given rise to new industries. New companies involved in the development, integration and maintenance of ICT have emerged.

At the same time ICTs have transformed activities in virtually all economic sectors. As a result, the boundaries between sectors are blurring (Huws & van der Hallen, 2004). It is for instance not easy to situate call centres in a specific sector. The same goes for web development companies: a large number of such companies emerged as a result of the introduction of ICT in graphic designing companies, extending their activities to encompass hosting services.

The introduction of ICT has also enabled the bridging of spatial and time limits, accelerating the processes of globalisation and delocalisation.

New emerging companies imply new emerging jobs and occupations. Furthermore, the integration of ICT into the processes of other economic sectors has also caused changes in existing occupations. A secretary for instance, may work a whole day with various computer programmes, a teacher may introduce students to the use of computers and a nurse may be assisted by a computer. These trends impact both on the competence needs and on the localisation (sectoral and geographical) of these needs.

10.1.2 Knowledge is becoming an important production factor

The idea that the economy is moving towards a 'knowledge-based' economy has become commonplace in social analysis and in public discourse. This idea goes under a variety of labels, including 'knowledge industry', 'information economy' and 'post-industrial society'. In the broadest outline, the thesis is similar whatever name it is given: in the New Economy knowledge has become the key factor in production, diminishing the primary roles of capital and labour. In the words of Daniel Bell, 'if capital and labour are the major structural features of industrial society, information and knowledge are those of post-industrial society' (Brint, 2001).

According to Drucker (1993) 'knowledge is applied to knowledge itself'. Following Drucker, Nonaka has described how this process works, referring to examples from the automobile industry. The main idea underlying this work is that making tacit knowledge explicit is a prerequisite for continuous innovation (Brint, 2001).

Organisations are challenged to develop new knowledge and apply it to improvements or innovations of products, services and work processes (Kessels, 1998). This trend has

implications for organisational structures, for the content of work and thus for competence requirements.

10.1.3 Increasing need for flexibility

Flexibility is a major challenge for contemporary companies. Technologies change rapidly; customers want tailor-made services; the educational level has increased and employees' expectations of working conditions have changed. It is often stated that the traditional tayloristic way of organising work is no longer feasible for surviving in a 'flexible' socio-economic environment. The efficiency of companies is no longer maximised by the far-reaching standardisation of tasks and the hierarchical structures typical of taylorism. Organisations must adapt.

Nevertheless, there is controversy about the extent to which companies have adjusted to these flexibility needs. Organisational changes are often conceived as being the result of a unilinear process whereby socio-economic circumstances force all organisations to change from a 'traditional' to a 'modern' organisational structure. The modern organisation, it is then assumed, is characterised as a flat organisation where employees work very autonomously and are involved in the strategic decision-making processes of the company. In reality, however, the evolution is differential rather than unilinear.

Some employers successfully mutate from the traditional organisational structure to a 'modern' one. Other companies try to find a compromise between the ideal-typical 'flexible organisation' and traditional organisational structures. Aiming for a new organisational form, employers are confronted with (paradoxical) dilemmas:

- between the *autonomy* of employees and employers' *control over the work* (Van Hooff, 1998). Due to the need for flexibility and quality, employees at the executive level must be able to take decisions autonomously and creatively. At the same time, management wants to control employees;
- between *learning opportunities* and *production* (Van Hooff, 1998). On the one hand, companies need employees who have up-to-date knowledge; on the other, employees must be productive. Combining learning and producing seems impossible at first sight. The idea that time spent on learning is a waste of production time is often at the root of non-participation in training.

The answers companies have formulated to these paradoxical dilemmas impact on their organisational structures and on the design of jobs and thus also on job content and the related competence requirements. More and more organisations opt for multi-tasking, putting forward demands of broad employability.

10.2 New occupations in the New Economy

New socio-economic circumstances, such as the integration of ICT and the increasing need for flexibility, have given rise to new occupations. In the STILE research we wanted to study two new emerging ICT occupations in depth. This work allows us to describe some important characteristics of occupations in the New Economy.

One important characteristic of new occupations is that they do not readily lend themselves to characterisation according to traditional occupational definitions. Before elabo-

rating on the characteristics of new occupations, we discuss how occupations in the new economic environment can be best defined.

10.2.1 New occupations need an adjusted definition

10.2.1.1 Difficulty in applying traditional definitions to new occupations

Traditionally an occupation is defined as:

> A *coherent cluster of tasks* that is *neither directly related to the task performer nor to the concrete organisation* where it is performed and on which a *social consensus* exists (SERV, 2001; translated by HIVA).

There are some problems with applying this definition to activities in the New Economy:
- *organisational diversity* is much higher than in traditional labour markets, making it difficult to abstract clusters of tasks from the concrete organisational context. In one organisation people involved in development are also involved in sales or strategic management, while another company might employ someone solely to develop a specific technology. In addition to this variety in work organisation, technological diversity has also expanded. Very often descriptions of new jobs refer to very specific technologies (e.g. 'a JAVAscript programmer', or a 'CISCO installer'). It is not easy to decide which jobs can be grouped under the same denominator of 'a certain occupation';
- there is *no social consensus* yet on the definition of new occupations. This is very well illustrated in discussions on call centre employees. Are they to be conceived as a separate occupational group or is it more relevant to assign the employees of a call centre to existing groups, such as sales representatives and clerical staff? Another case in point concerns 'webmasters' or 'web developers'. Again, discussions concerning these activities display a lack of consensus on a definition. In discussions about these 'occupations' there are often as many definitions as there are parties involved in the discussion.

Taking into account these challenges, we decided to review the definition, focusing on a logically coherent cluster of activities.

10.2.1.2 'Clusters of activities' are more practicable

The final goal of the STILE project was to gain insight into the tasks and competences that are a prerequisite for being able to perform well in ICT jobs. Therefore, it was relevant to focus the research on 'clusters of activities that are most often related to each other'. Starting from the perspective of the value chain involved in 'developing and delivering ICT services' and relying on existing research,[1] it was possible to discern such activity clusters.

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1 Career Space, SFIA-Skills Framework for the Information Age, GAHFA-Geshäfts- und Arbeitsprocesse als Grundlage und neue Orientierung der Berufsbildung.

The table below gives an overview of the 'clusters of activities' as they were defined in other relevant European research on occupational profiles for ICT occupations. The GAHFA and the SFIA (Skills Framework for the Information Age) studies clearly make use of the value chain perspective for developing and delivering ICT services. Both studies mention ICT-specific activities as well as more general activities that are not exclusive to the 'production and delivery of ICT products and services'. Examples of the latter are sales and marketing and consultancy. Activities that are specific to ICT companies are focused on the development of ICT systems and applications and the integration and administration of these services and applications (GAHFA). The GAHFA model puts activities that are related to the installation of infrastructure in a separate cluster. The SFIA model puts development, integration and installation under the same heading, 'development and implementation'. The rather general heading of 'service delivery' in the SFIA model is made more specific in its subdivisions. Service delivery implies network administration, user support, etc. In the GAHFA model, service delivery is conceived as support and systems service. These general activities are carried out in a variety of jobs within ICT companies.

The Career Space model adopts a somehow different approach. In this model, ICT-related activities are subdivided on the basis of the kind of ICT product. Some activities are 'cross sectoral', whilst other are focused on the delivery of software and services or telecommunications, etc.

Table 10.1 Overview of clusters of activities in existing European research

GAHFA	Career Space	SFIA
ICT marketing, consulting & sales **ICT business & project management**	**Cross-sector**	**Sales & marketing** **Management & administration**
ICT systems & application development **ICT integration & administration**	**Software & services** *Technical support* *Multimedia design*	**Strategy & planning**
ICT infrastructure & installation	**Products & systems**	**Development & implementation** *Systems development* *Human factors* *Installation and integration* *System integration* *System installation*
ICT support & systems service	**Telecommunications** *Digital design* *Radio frequency engineering*	**Service delivery** *Education and training* *Infrastructure* *Network control* *Operation* *User support* *User support* *Network administration*

Source: Petersen et al., 2004 (adjusted by HIVA)

The overviews make it possible to define ICT-related activities and to describe jobs within companies. A system analyst for example is involved in the cluster of 'ICT systems and applications development'.

The STILE project wanted to gain in-depth insight into a set of activities that contribute to the 'delivery of ICT services'. Combining the two approaches, we decided to focus attention on two clusters of activity, involving respectively the development of websites (development and implementation of software and services) and customer support with respect to telecommunications, products and systems. Within the first cluster we focused on the development, implementation and maintenance of websites. In the second cluster the focus was on the provision of support to customers experiencing technical problems with access to telecommunications networks (ranging from mobile phone access to Internet access to integrated systems). Table 10.2 demonstrates visually the clusters of activities that are at the centre of the STILE research. It starts from the SFIA overview of work areas because this 'Skills Framework for the Information Age' is the most generally applicable (and applied) of the three overviews.

Table 10.2 Clusters of activity that are at the centre of the STILE project

		Web development and maintenance	Customer Technical Support
Dev. & implementation	Systems development	X	
	Installation & integration	X	
	Human factors		
Service delivery	Education and training		
	Infrastructure		X
	Operation	X	X
	User support	X	X

For customer technical support the research focused on activities related to infrastructure, operation and user support. The definition of this cluster was based on existing job descriptions. These showed which activities were most often clustered together. In order to generate profiles that can serve employers' needs, it is necessary to focus on a cluster of activities rather than a single specific activity. Companies no longer have clearly defined jobs, and, moreover, jobs change rapidly. Therefore, it is increasingly expected that employees will be employable in a group of adjacent jobs. An exploration of customer technical support jobs led to the conclusion that support of customers is often combined with keeping the company's infrastructure operational. In some companies these tasks are clustered into a single job, whilst in other companies employees can progress from a support job to a 'network administrator' job. Occupational profiles that make an inventory of such a cluster of activities can be used as a basis for a competence management strategy that aims to develop broadly employable employees who can grow with the companies.

10.2.2 Characteristics of new 'occupations' in the New Economy

Companies are challenged by the abovementioned socio-economic trends. The way they deal with these challenges influences their organisational structures, the design of jobs and thus the tasks and their related competence requirements. In this section we discuss how the socio-economic challenges have influenced the organisation of customer technical support activities and of activities related to web development and maintenance. This allows us to deduce some general conclusions on the characteristics of the new 'occupations'.

10.2.2.1 Socio-economic challenges call for organisational answers

Penetration of ICT

The increasing penetration of technologies implies rapid technological change. Moreover, technologies have organisation-specific applications. Employees must be able to work with the organisation-specific technologies and must also be able to keep pace with the evolution of new systems and applications. Companies enable this lifelong learning by providing opportunities for participation in formal training programmes. Nevertheless, in most cases they also encourage employees to take informal learning initiatives. Employees must use their own initiative to look for information and to consult other specialists. Companies support these self-learning initiatives by making information easily available, stimulating contacts between colleagues, including self-learning as an assessment criterion, making time free for private study, etc. What is more, socio-technical theory shows that companies can deal with the paradoxical dilemma between learning and production, by designing jobs in such a way that the work itself entails learning opportunities. Such jobs are broadly composed and require co-ordination with colleagues (Van Hooff, 1998).

Knowledge is becoming an important production factor

As knowledge becomes an important production factor, companies must try to manage flows of knowledge. Striving for an organisational learning process, companies develop various procedures and systems. They expect employees to contribute to this from their daily experience. If they are confronted with experiences that are relevant to the whole organisation, employees must communicate this in the appropriate way in order to make the new knowledge accessible to relevant colleagues.

This can best be illustrated by the example of customer technical support. As it is impossible for employees to know all technologies on the market, companies develop stepwise procedures for solving frequently arising problems and develop databases for making the relevant knowledge available more broadly. One important task of employees involved in customer technical support is to 'contribute to the adjustment of these systems and procedures'. This implies three subtasks. First, if they are confronted with unusual problems that are relevant to the company, they are expected to report on these. In most companies this means that they discuss this problem in formal team meetings or that they report on it in databases that are accessible by colleagues. The final goal is to construct or improve procedures. Second, most companies expect their customer technical support

employees to develop procedures for troubleshooting new technologies. When a new product or service is launched, customer technical support employees must experiment with these services, provoking user-specific problems. On the basis of these experiments they develop (or at least adjust) procedures for troubleshooting. Third, customer technical support employees must follow up technical developments in one specific domain by reading manuals and theoretical works, consulting specialists, etc. They are expected to share this knowledge with relevant colleagues within the company. Very often this means that they support colleagues who have queries about this specific technology. If they are more experienced, employees are also expected to write manuals or to provide training for their colleagues.

Therefore, in a knowledge economy, employees must contribute to the organisation's knowledge and the development of procedures and systems to codify that knowledge.

Increasing need for flexibility

The increasing need for flexibility requires companies to adjust structures and strategies. These organisational changes impact on the content of jobs and thus on the knowledge and competence requirements that are related to these jobs.

There is no unilinear change from hierarchical organisations where most processes are standardised towards horizontal companies that stimulate creativity. As we stated above, companies are often challenged by the choice between autonomy and control and between learning opportunities and production. The study of customer technical support and web development and maintenance showed that companies' answers to these dilemmas vary considerably, with a range of different implications for jobs and hence for 'occupations'.

It is clear that some companies opt for standardising customer technical support tasks to a large extent (high control, low autonomy), while others only work out clear procedures for supporting the creative work of customer technical support employees (low control, high autonomy). If work is standardised, employees are expected to make use of a checklist, leading them through the processes of diagnosis and troubleshooting. Problems that cannot be solved with the assistance of these checklists are escalated to technical specialists. If companies opt for general stepwise procedures for dealing with technical problems, employees must diagnose and troubleshoot problems themselves, consulting colleagues when they encounter problems.

We have already noted that the dilemma between learning and production is a paradoxical dilemma. Learning can take place either explicitly or implicitly. Companies can stimulate explicit learning initiatives by enabling formal training and stimulate self-learning initiatives (as already described). In this case there is a trade-off between production and learning: employees are not directly productive when they take learning initiatives. In the case of implicit learning however, there is no trade-off. Companies can design jobs in such a way that they entail learning opportunities. This presumes that jobs contain a broad range of coherent tasks and opportunities for co-operation and autonomy for employees (De Sitter, 2000). In some companies, jobs involve more learning opportunities than in others. Some companies have very specialist jobs stimulating co-operation, while other organisations have broad job descriptions. The example of web development and maintenance illustrates this particularly clearly. In some companies, functional analysis is

carried out by commercial people, while the development and the production of the website is subdivided into various specialist work domains such as graphic design, JAVA programming, promotion of websites, etc. In other companies jobs are composed rather broadly. In this case employees contribute to as many stages of the web development as possible; they are involved in the functional analysis as well as in the development of the web structure as the final realisation of the website.

10.2.2.2 Consequences for occupations

The socio-economic trends of ICT integration, flexibilisation, globalisation and rapid change and the organisational responses to these trends have consequences for the characteristics of occupations. The STILE research on web development and maintenance and on customer technical support identified some important characteristics of new occupations. We summarise the most important ones:

- *technological diversity*: a variety of technologies exist. Whereas in the past an occupation was often defined in terms of the technology used, this is no longer possible in the *e*Economy;
- *organisational diversity:* a cluster of activities may be given a different shape in differing company environments. Some organisations subdivide the cluster into various sub-activities, while other put the entire cluster into a single job;
- *turbulence:* turbulent socio-economic circumstances imply changing organisational structures and changing corporate use of technologies. As a result, tasks and competence requirements change more rapidly in the New Economy;
- *information-based activities:* activities are to a large extent focused on the 'production and transmission of information';
- *competences are central:* in addition to knowledge, skills and attitudes are becoming essential indicators of good employee performance. Of course these have always been important for performing well; what has changed is the importance companies attach to these skills and attitudes. In a turbulent environment, lifelong learning and employability in an organisation rather than in a function are becoming important. Moreover, companies must be able to learn as a company. In that context the ensuing skills and attitudes are at the core of jobs.

The STILE research showed that employees in the New Economy are expected to 'share and codify knowledge'. Sharing information for setting up 'organisational learning processes' requires from employees that they 'contribute to the adjustment of systems and procedures'. They can do this for instance by participating actively in team meetings, communicating their relevant experiences. Sharing information also takes place when experienced people support colleagues who are experiencing problems. This trend of 'organisational learning and knowledge sharing' therefore requires employees to have good communications skills and to be able to decide which experiences are relevant for other colleagues. They must also be able to translate this knowledge into useful information, be team players, etc. These parts of the job are difficult to capture in terms of tasks. Moreover, these competences cannot be taught using traditional educational methods; rather, they are generally learned informally (in daily life, on-the-job, etc.).

Table 10.3 Important activity domains and related competences in knowledge-based activities

Task	Subtask	Knowledge, skills & attitudes needed to perform tasks
CONTRIBUTE TO ADJUSTMENTS OF SYSTEMS AND PROCEDURES	Communicate systematically on problems experienced	- Ability to assess the relevance of own experiences for the organisation - Ability to select the most appropriate channel for communicating experiences (informal, email, formal team meeting, database accessible to team members or to the whole organisation, intranet, etc.) - Ability to communicate experiences in a structured way, taking into account the interests of the 'users' of this information - Ability to participate actively in team meetings - Ability to communicate criticism constructively - Proficient in contacts (i.e. able to build and sustain a network of contacts) - Team player
SUPPORT COLLEAGUES	Assist colleagues handling problems	- Ability to ask purposive questions to get problem clear - Ability to give clear, ready-to-use answers to colleagues (by telephone, email or chat), taking into account the colleague's knowledge level - Ability to maintain constructive relationships with internal/external colleagues - Ability to train colleagues (giving presentations, writing manuals or discussing problems less formally) - Proficient in contacts - Team-player
LEARN ON A CONTINUOUS BASIS	Contact internal/external specialists	- Knowledge of general technologies underlying the products and services - Knowledge of organisational chart - competences available in the organisation - Knowledge of important business partners' competences - Knowledge of internal/external (written and unwritten) rules for communication - Ability to maintain constructive relationships with colleagues - Ability to discuss technical issues with specialists - Proficient in contacts - Team player
	Search for information from internal/external sources	- Knowledge of relevant sources of information - Ability to search various sources purposively - Ability to internalise/operationalise information - Eager to learn - Autonomous

10.3 Existing profiling methods challenged

These characteristics challenge existing occupational profiling methods: first, because new occupations are not clearly demarcated yet; second because the work that is carried out is not always easy to capture in terms of tasks; and third, because job content and related competence requirements change more rapidly then they did in the past.

In the third part of this chapter we present an occupational profiling method that has proved to be successful for profiling various occupations in the past. We then discuss some difficulties with applying this method to occupations in the New Economy. An

analysis of the difficulties and the solutions we developed within the STILE project will lead to recommendations on occupational profiling in the New Economy.

10.3.1 The conference method as a good practice

The conference method is an occupational profiling method that has been developed by HIVA and has been applied successfully to a broad range of occupations. The method shows similarities to the internationally well-known DACUM method.[2] Both profiling methods make use of discussions in a group of experts for obtaining a validated overview of tasks and related competence requirements. The conference model is a four stage model. Table 10.4 summarises the stages and their outcomes.

Table 10.4 Overview of stages in the conference model

Stage	Name	End product
1	Orientation	Definition of the occupation
2	Preparation	Concept profile
3	Conference	Interim profile
4	Verification	Definitive profile

Source: Sels, 1996 (adjusted by HIVA)

10.3.1.1 Orientation and preparation

After a stage of elaborated desktop research on socio-economic trends in the sector of employment, researchers start to develop a concept profile by making an analysis of existing functional and occupational descriptions. In addition to this desk research, they interview job occupants, supervisors and HR managers. The focus of these interviews is on daily work, organisation of work, recruitment, training, etc.

This research stage results in a concept profile, which is a preliminary overview of tasks and related competence[3] requirements. In addition, it includes information on the organisation of work with respect to the occupation itself and the associated career opportunities and also makes some future projections on the occupation.

10.3.1.2 Conference

In a next stage the concept profile is discussed within a group of experts: representatives of the educational system, training institutions, HR managers, practitioners, union repre-

2 DACUM is an acronym for Developing A Curriculum. The most important aspect of the DACUM approach is *'conducting job analysis'*, which is not carried out by questionnaires or structured interviews but in *a workshop setting*.

3 The term 'competences' refers to knowledge, skills and attitudes.

sentatives, etc.[4] Major questions running through these discussions are, 'To what extent does the description of the concept profile exist in the organisations?', 'Are there some tasks that do not belong to the occupation?', 'Which tasks are not included in the profile yet?', 'Which competence requirements are more or less important?' and 'Which competences are easy or difficult to find on the labour market?'. In discussing these questions, the group validates the concept profile.

10.3.1.3 Verification

On the basis of these group discussions the researchers adjust the concept profiles. This reviewed version of the profile is submitted to the group of experts and job occupants for assessment. This assessment is a final verification of the profile. It results in a profile that is both close to the organisational reality and agreed on by a representative group of labour market actors.

10.3.2 Challenges for a rigid application

ICT occupations in the New Economy cause some problems for a strict application of the conference method. The most important reasons are discussed below:

- ICT occupations are 'new emerging occupations'. There is a lack of consensus on a clear definition of the occupations. Moreover, organisations give shape to the occupations differently *(organisational diversity)*. This causes problems for keeping discussions in a diverse group of experts focused. Each expert looks at the occupation from his/her own experience. In an international context the definitional problem causes extra problems for mutual understanding and for achieving a common focus;
- the technologies used in the occupations are very diverse and change rapidly *(technological diversity and turbulence)*. This diversity causes problems mainly for describing the knowledge requirements and achieving a common agreement on this;
- activities in the contemporary economic field are to a large extent focused on 'production and transfer of information' *(information-based activities)*. Moreover, companies pay attention to employees' soft competences *(competences are central)*. This means that some parts of the job are difficult to capture in terms of tasks and knowledge. Interviews about daily activities cannot easily encompass all responsibilities and related competence requirements. In addition to this, skills and attitudes are difficult to formulate unambiguously, making it hard to achieve common agreement. Nevertheless, occupational profiling initiatives are challenged to reveal measurable and 'objective' indicators for competences.

10.3.3 New occupations call for a flexible application

The conference method was the starting point for the STILE occupational profiles. Confronted with difficulties in applying the method rigidly, we searched for solutions that are more feasible for studying newly emerging knowledge occupations.

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4 The composition of the conference depends on the objective of the occupational profiling exercise.

10.3.3.1 Difficulty of demarcating occupations

There is no general agreement yet on the demarcation and definition of ICT occupations. Nevertheless, developing a profile that is generally agreed on requires that all parties involved have a clear understanding of the subject of research and discussion. Therefore we started from an overview of activities that are carried out within ICT companies. On the basis of existing job descriptions, contacts in companies and existing related research, it was possible to demarcate clusters of activities that are 'closely related to each other' in most companies. The clusters of activities as they were defined in the STILE research and the GAHFA and SFIA-model on which they were based are discussed in more depth above (see Table 10.2).

In this way the focus of the research was clear to all parties involved in it (respondents, labour market experts, etc.). This approach also ensured that the results of the research would be useful.

10.3.3.2 Difficulty in capturing occupations in complete overviews of tasks

Traditionally an occupational profile gives an overview of tasks that are carried out within an occupation. This overview of concrete tasks is the basis for deducing competence requirements that are related to the performance of these tasks. For the occupations of web development and customer technical support, we were faced with the difficulty of capturing the activities completely and translating them into task terms. In order to ensure that all tasks/responsibilities were included in the overview, we made use of the four-level task model. This socio-technical model distinguishes executive, preparatory, supportive and organisational tasks. The box below gives a more detailed description of these.

> ***Executive tasks***: these tasks form the core of an occupation. Without executive tasks the occupation would not exist. Usually the title or the description of the occupation itself refers to executive tasks.
>
> ***Preparatory tasks***: these are tasks that must be carried out in the preparation of the executive tasks. The most important preparatory tasks usually concern the planning of work sequences, the preparation of working material, the determination of working methods, etc. 'Preparatory' must always be interpreted as a preparation of one's own executive tasks, not as a preparation of someone else's tasks.
>
> ***Supportive tasks***: these are tasks that make it possible to perform the executive tasks in a good and undisturbed way. The most important supportive tasks usually concern maintenance, administration, quality control, etc. Again, 'supportive' must be understood as related to one's own executive task, not as support to someone else's task. For instance, maintaining a machine is a supportive task for a machine operator whose main task is to operate the machine. But it is an executive task for a mechanic whose main task is to maintain machines. In the case of web development, supportive tasks are quality control and keeping up competences.
>
> ***Organisational tasks***: these are tasks that refer to the organisation of work insofar as this applies to one's own work beyond one's own immediate workplace. Organisational tasks are performed when the executive tasks require contacts with other

people in the organisation, be it through functional contacts, consultation, participation in work groups, etc. In the case of web development, the co-ordination of one's own work with the work of others in the organisation constitutes such an organisational task.

Aiming to complete this four-level model, researchers gained insight into activities that are difficult to capture in terms of tasks. Organisational and supportive tasks are less visible and thus more difficult to translate into task terms. Searching for information or consulting colleagues when confronted with a problem is an example of important but less visible supportive activities. Communication about relevant experiences (e.g. in team meetings) is an important activity within organisations striving to manage available knowledge.

We kept this four-level model in mind when interviewing people within the organisations. It is not easy to get all the necessary information on daily activities from interviews. Answers to the question 'What do you do in your daily work?' mainly provide information on the executive tasks. In order to gain insights into other tasks we asked questions such as 'Who/what do you rely on when you have difficulties solving a problem?' or 'Do you have meetings with your colleagues?', 'What is discussed?', 'What kinds of people have a constructive contribution to make in meetings with colleagues?', etc. As job occupants cannot give relevant information on all task levels, we tried to complete the picture through interviews with supervisors and HR managers. Such interviews can reveal information about knowledge management, the organisation of work, internal communication, and other less visible activities/responsibilities. In these interviews it can become clear for instance how different divisions within the company are expected to fine-tune work, share information, etc.

10.3.3.3 Difficulty of finding a common denominator in a diverse field

In developing occupational profiles, we were faced with the difficulty of constructing a description that is applicable to all companies' realities. In some companies, work was standardised to a large extent whilst in others the work demanded a lot of creativity from the employees. Moreover, the technologies used were very diverse, requiring knowledge of different technologies. For instance, in one company employees were required to have knowledge of broadband access, whilst in another company the focus was on wireless modems.

In the STILE project we dealt with this difficulty by developing a three-level continuum of competence requirements. The levels were distinguished on the basis of two indicators: autonomy and complexity. The specific technologies used were not taken into account. They were conceived as company-specific applications of a general technology which we termed 'Internet access technology'. This led us to the following description of the three levels.

Level 1: work can be carried out according to standardised procedures. The performer can rely on basic knowledge.

Level 2: work can partly be carried out according to standardised procedures. Some tasks require a creative and rather specialist approach.

Level 3: work requires a creative approach to solve 'problems'. The performer often needs to rely on specialist knowledge.

Applied to a specific occupation, this resulted in the following overview of competence requirements.

Table 10.5 Example of descriptions of competences at various levels

	Level 1	Level 3
Solve the problem or assist the customer to do so	- Knowledge of existing procedures for troubleshooting problems - General knowledge of software configurations at the basis of services - Knowledge of hardware composition (at the customer's site and in the organisation) - Ability to select the most appropriate troubleshooting procedure - Ability to introduce small changes in software configurations as specified in procedures - Ability to reset or change hardware components as specified in procedures - Ability to assist the customer to run through existing stepwise procedures, taking into account customer's (technical) knowledge level (by telephone or email)	- Knowledge of software configurations and how they steer the services - Knowledge of hardware and links between various hardware components (how they interact) - Ability to work out a plan for troubleshooting technical problems - Ability to work out a clear stepwise plan for the customer to run through the troubleshooting process, taking into account the customer's (technical) knowledge level (by telephone or email)

The overview distinguishes between three levels. The first level gives a description of competence requirements in jobs that are standardised to a large extent. Customer technical support requires general knowledge of troubleshooting procedures as well as general knowledge of software configurations and hardware composition. As the work is standardised according to clearly developed stepwise procedures, employees must be able to run through these stepwise plans taking into account the customer's knowledge level.

In other companies, or for some 'irregular problems' in the 'standardising' companies, work is less standardised. In these cases customer technical support requires employees to have knowledge of software and hardware and how they interact in order to be able to work out a plan for troubleshooting complex problems.

The profile does not mention any specific technology. It only illustrates that technical knowledge requirements vary from general knowledge of hardware and software configurations to an understanding of software configurations and how various hardware components interact.

This way of representing competence requirements enables a common agreement on the profile, as the requirements depend on the design of the job and the experience of the workers.

This kind of overview is more useful for a broad group of users than a single level overview. Educational institutions preparing students to enter the labour market can focus on requirements at level 1, whilst training centres are more interested in requirements at level 3. Such a layered scheme can also inspire companies to create career paths, starting with employees having competences at level 1 and stimulating them to achieve competences at level 3 during their career.

10.3.3.4 Difficulty of capturing organisational differences

Searching for a common denominator we were confronted with the problem of organisational diversity. A single cluster of activities is given shape differently in different organisations. As we wanted to develop a profile that reflects the full spectrum of organisational reality, we opted for an extended overview of tasks. Table 10.6 illustrates organisational variances on the profile of customer technical support and how companies divide a general cluster of activities across different jobs. Representatives of small as well as large companies can assess the overview as being a precise and complete description of their jobs.

In large companies, customer technical support is often subdivided into first and second line support, whereas among small companies there are some that have a separate customer support 'department', whilst others do not. The first line support in large companies is often standardised, which means that the task of 'filtering out routine technical problems' is carried out according to standardised procedures (at level 1 and 2 - see above for the levels). In small companies with a separate customer technical support department, on the other hand, customer technical support also implies dealing with irregular problems (problems for which no standardised troubleshooting procedure exists). This means that 'filtering out routine technical problems' is carried out also at the third level.

The table also illustrates that not all tasks are carried out in all customer technical support jobs. First line customer technical support employees in large companies are not expected to carry out experiments on services and products. Participation in formal training is less a responsibility for employees in small organisations.

This way of representing variations on the general cluster of activities has an important added value. Information on organisational alternatives can inspire measures for matching the demand for competences with the labour market supply of competences. Table 10.6 illustrates for instance how companies can subdivide the cluster of activities in such a way that some tasks can be carried out by employees with a limited technical knowledge (first line jobs in large companies). In second line jobs, employees with more technical knowledge (often on the basis of first line experience) assist customers with more complex tasks (keep the customer informed and finish off intervention at level 2-3) and can solve technically complex problems (troubleshoot technical problems) for which there is no standardised solution (level 2-3).

Table 10.6 Example of a compromise between generality and differentiation; organisational variances on the customer technical support profile

Tasks	Large organisation (+50 employees)		SME (-50 employees)	
	1st line	2nd line	CS*	No CS
Filter out routine technical/administrative problems				
Make first inventory of problem	1-2		1-3	1-3
Solve routine technical problems and administrative problems	1-2		1-3	1-3
Troubleshoot technical problems				
Make a technical analysis of the problem		1-3	1-2	1-3
Solve the problem or assist customer to do so		1-3	1-2	1-3
Escalate problems that call for specialist intervention		1-3	1-2	
Monitor progress of troubleshooting process		1-3	1-2	
Link customer and technical specialists				
Receive customer in a professional and friendly way	1-3		1-3	1-3
Keep customer informed	1-2	2-3	1-2	1-3
Finish off intervention with customer	1-2	2-3	1-2	1-3
Contribute to adjustments of systems and procedures				
Communicate systematically on problems experienced	X	X	X	X
Carry out experiments with products and services		X		X
Translate experiences/in depth knowledge into (suggestions for) adjustments of systems and procedures	X	X	X	X
Maintain administration				
Report on interventions according to internal rules	X	X	X	X
Learn on a continuous basis				
Participate in training	X	X		X
Contact internal/external specialists	X	X	X	X
Search for information in internal/external sources	X	X	X	X

* CS refers to companies with a separate customer service department. 'No CS' are companies with no separate customer service department.
The table is based on the case studies; it is not validated.
The table indicates whether the various tasks are to be performed or not. An 'X' indicates that the task is to be performed. In some cases it is relevant to differentiate various competence levels that are required to perform the task (see above for a description of the competence levels).

10.3.4 Towards methodological recommendations

Drawing on the STILE experiences of applying the conference method for putting new occupations in an international comparative perspective, it is possible to put forward some recommendations for profiling occupations in the New Economy. As the STILE profiles have not yet been validated in practice, these recommendations must be regarded as tentative at present. Other research should assess the usefulness and the accuracy of the profiles as they have been developed within the project.

10.3.4.1 'Start with a clear demarcation of the cluster of activities'

The profiling exercise must start with a clear demarcation of the occupation/cluster of activities. The perspective of the general value chain can be very helpful if occupations are not clearly demarcated yet. This prevents the parties involved from generating their own definitions, causing problems for mutual understanding.

10.3.4.2 'Explore the cluster of activities completely and in depth'

In-depth exploration of the cluster of activities requires the researcher to keep a four-level model in mind. According to socio-technical systems theory a coherent activity cluster consists of preparatory tasks, executive tasks, organisational tasks and supportive tasks. Aiming to complete this four-level model, researchers gain insight into activities that are much more difficult to capture in terms of tasks.

10.3.4.3 'Find a compromise between generality and differentiation'

Layered competence requirements

In order to find a compromise between differentiation and generality, it is relevant to distinguish various levels of 'mastery' for the competence requirements. It is neither possible nor relevant to capture information on requirements for knowledge about organisation-specific technologies. Nevertheless, it is relevant to distinguish various levels of 'mastery'. Distinguishing different levels of competence makes it possible to take into account differences that are due to relevant organisational factors and those that are related to the level of experience of the occupants.

Organisational differences

An occupational profile may be viewed as a common denominator of most frequently-adopted organisational practices. Companies translate general clusters of activities into different job designs. This is especially the case for new emerging occupations. Companies are still searching for the best way of giving shape to these new activities. As a result, organisational diversity is high for these new clusters of activities. It is still useful to look for a general common cluster of activities. Nevertheless, including information on organisational variations across the general cluster of activities enables validation in a heterogeneous group and thus common agreement on the profile.

10.4 The New Economy calls for an international comparative perspective

The New Economy is characterised by a trend of globalisation. Supranational policy-makers are encouraged to support measures fostering growth. The European Commission has set the challenge of improving the match between competence demand and supply on the international (European) labour market. At the supranational level there is a need for

internationally comparable information on labour market demand and supply of competences.

It was beyond the scope of the STILE project to give a total explanation of the dynamics of European labour market variation. Labour market demand and supply are the result of a complex interplay of technological evolution, cultural aspects influencing participation in the labour market, differences in labour law, tax and pay regulations and other factors. The STILE experience has shown that this complex interplay of factors does not only impact on the shape of the labour market, it also impacts on the comparability of qualitative case study material. The globalisation of labour markets is therefore not only a challenge for policymakers, but also for research consortia running international comparative qualitative research.

The STILE project has made it possible to formulate some recommendations for putting occupational profiles into an international comparative perspective. In addition to this, insights into the occupational profiles also make it possible to pose some interesting questions for future international comparative research.

10.4.1 A reference framework as a common language

STILE's experiences of developing occupational profiles in an internationally composed consortium have led to the conclusion that international comparison is possible only if it is based on a common reference framework.

For the STILE research each of the national partners developed a national occupational profile. For this they relied on common guidelines on the selection of interviewees, checklists for the interviews, formats for the profile, etc. The resulting national profiles were, however, still difficult to compare. The profiles were based on different case studies and had a different structure. Moreover, they made use of different concepts. The need for a common reference framework for comparing occupational profiles forced itself upon the consortium.

The further work of the STILE project was focused on the development of a framework profile. The framework gives an overview of tasks and related competence requirements (at three levels). It is a profile that must be assessed for its accuracy and usefulness by experts in the various countries. For this validation the following guidelines are important:

10.4.1.1 Select a comparable group of experts

Experts all look at the occupation from their own point of view. Each wants to do something different with the profile. Moreover, being representatives of important groups on the labour market and seeing it through these 'lenses', they may under- or overestimate some trends. This not only hampers constructive discussions within heterogeneously composed groups, it can also distort the occupational profile. Therefore, if the profiles must be internationally comparable, it is important to use the same criteria for selecting experts in all participating countries. These criteria depend on the objectives of the occupational profiling work.

10.4.1.2 Submit the framework profile to the same questions

The questions that are put forward for validation of the framework profile determine to a large extent what information will be available in the resulting profile. In order to make sure that all relevant information is available for all countries, it is necessary to agree on a common list of questions. Examples of questions that are at the core of validation exercises include:
- Is the concept profile accurate? Are there tasks/activities that are superfluous/missing?
- Which tasks/activities are the most important?
- Which activities can be performed by inexperienced employees?
- What is an ideal-typical career path for the occupation that is under scrutiny?
- Is there a difference between large and small companies?
- Is the overview of competence requirements accurate? And is it useful?
- Which recruitment requirements are put forward? Which training needs?
- How do companies make sure that employees keep pace with technological turbulence?
- Which of the listed competences are most important for achieving those objectives?
- Do companies mainly work with technical specialists or do they prefer generalists?
- How do they encourage people to work together?
- Which trends are important in the near future?
- What are the likely consequences for activities and competence requirements?

10.4.1.3 Apply the same method for discussing the profiles;

Discussion of the profiles can be organised in several ways. The most relevant methods are a postal survey, a bilateral interview and a group discussion. All of these methods have their strengths and weaknesses. They also reveal different kinds of information. In a postal survey, for instance, it is only possible to ask questions about the accuracy of the list of tasks and competences. Group discussions, on the other hand, make it possible to confront various visions with each other, thus generating a synergetic effect. Nevertheless, group discussions can be very time-intensive, making it difficult to run through the entire list of tasks and competences.

In order to make international comparisons possible, it is important to make sure that all countries make use of the same method.

10.4.2 An initial impetus to international comparative research

In-depth study of customer technical support and web development and maintenance allows us to propose some questions that call for international comparative research.

With respect to customer technical support the following research questions may be raised.
- Is there a difference between countries due to differences in the labour market? The research revealed that some companies changed the design of jobs in order to be able to reduce recruitment requirements. These companies created entry-level jobs, focussing on the first reception of customers, making an inventory of the problem and dealing with administrative problems and frequently-emerging technical questions. Standardisation of these tasks by developing checklists allowed the companies to recruit appli-

cants with no technical background for these jobs. Therefore, it can be assumed that in countries with a shortage of technical graduates on the labour market, tasks related to customer support are more likely to be standardised, requiring less technical knowledge than in countries with an abundant supply of technically educated graduates.
- Are there international differences in the profile of customer technical support of multinational companies that have customer technical support centres in different locations? The STILE research revealed that some multinationals have support centres in several locations over the world, whilst others concentrate the whole activity into a single central support centre. As the design of the jobs impacts on the competence requirements this is an important research question.

With respect to web development and maintenance, the following questions call for special research attention:
- Are competence requirements higher in countries where *e*Business penetration is higher? Are some tasks becoming more or less important? Are there newly emerging tasks related to *e*Business penetration? In the STILE research it became clear that there is a significant difference between designing static websites and websites with *e*Business applications;
- At what rate in each country are self-taught generalists being replaced by specialists trained to develop increasingly sophisticated commercial websites? Within the cluster of web development and maintenance a trend of specialisation and 'professionalisation' is emerging. In the past, most web specialists were self-taught people with a strong interest in technology and design. However websites are now becoming more extensive in scope and complexity and technologies are evolving rapidly. Moreover, formal training initiatives are being developed. It will be interesting to see whether this trend takes place simultaneously in all countries. This question is of special importance in a unified market; countries that are lagging behind risk exclusion from this market.

10.5 Conclusions

The New Economy is described in a variety of ways, with no general consensus as to its characteristics. In the STILE project, three main trends have been proposed as forming a context for occupational change: increasing penetration of ICTs, knowledge as a production factor and an increasing need for flexibility. The project has paid special attention to these characteristics as they impact on organisational structures and on human resources management. These changes at an organisational level imply changes on the demand side of the labour market. Changes in tasks and related competence requirements imply a change in responsibilities and measures for improving the mismatch between demand and supply of competences.

Occupational profiles offer structured insights into tasks and knowledge, and the skills and attitudes that are required to perform these tasks. They are used by policymakers, labour market institutions, training institutions and companies as a basis for 'matching measures'. If tasks, competence requirements and responsibilities on the labour market change, it might be possible that occupational profiling methods and formats need to be reviewed. The STILE project proposed three major research questions in order to understand new occupations in the New Economy and the consequences for research methods.

First, the STILE project focused on *the characteristics of new occupations*. In response to this research question the consortium has developed two occupational profiles for ICT occupations: one for customer technical support and one for website development and maintenance. The research revealed some characteristics of new occupations. Technological and organisational diversity in the shape of the occupations is much higher than in traditional occupations. In addition to this, 'new' occupations are more liable to turbulence. A last important characteristic is that occupations are to a large extent knowledge-based, making it difficult to capture them in terms of concrete and visible tasks. In contrast with traditional occupations, companies pay more attention to informally acquired knowledge, skills and attitudes. This means that, in addition to formal education and training, which provide channels for acquiring knowledge in a formal way, companies must also play an important role in offering informal learning opportunities. In this paper it has been mentioned that learning opportunities can be created by designing broad jobs that call for co-ordination and allow autonomous problem-solving.

Second, the STILE project scrutinised the *opportunities and limitations of existing occupational profiling methods for researching new occupations*. On the basis of this research experiences, it has proposed some methodological recommendations. One important conclusion was that occupational profiles can find a compromise between specificity and generality by subdividing competence requirements into several levels. For ICT occupations the degree of standardisation is a valuable criterion for distinguishing levels. Another interesting methodological conclusion concerns the need for international comparison. In a globalising economy there is a need for insights into competence requirements in different countries and for opportunities to compare these needs. The STILE experience has shown that it is not relevant to compare qualitative case study material. A number of national characteristics ranging from the legal framework, institutional factors and cultural aspects impact on the content, structure and terminology of case studies rendering detailed comparison impossible. In the new economic environment, future research is challenged to find qualitative research methods that allow for better international comparison.

Third, the STILE research revealed some *concrete research questions that call for international comparative research*. One question that calls for future research attention relates to the increasing number of multinational companies: 'Do jobs look the same in all countries in which the multinational has establishments?'. Another interesting question relates to the differences in educational systems and the skills level on the labour market: 'Are jobs in countries with a relatively low skill level composed differently and do they require different competences than in countries with a highly-skilled population?'. These questions need special attention in future research, especially in the context of the implementation of the Bologna agreement that aims at harmonisation of the European higher education area.

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11 How to measure eWork in social surveys

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Abstract

One of the objectives of the STILE project was to define indicators to identify teleworkers. For this purpose a set of indicators was defined which could be inserted into the statistical inquiries on labour forces in Europe. To measure teleworkers the main problem is choosing a definition of the phenomenon. The essential aspects for identifying teleworkers are: the place where the work is carried out, the amount of time spent working at a distance from the main office and the importance of the use of ICT.

In this chapter we describe the difficulties and dilemmas encountered by researchers attempting to measure telework. We discuss the strengths and weaknesses of the two main options: either to provide a definition and categorisation of telework and to process the answers; or to design a set of indicators that leads to the identification of various telework patterns through the cross-tabulation of collected data. Concluding that the cross-tabulation approach is preferable, we select a set of indicators useful to capture both the core traits, that are necessary to quantify teleworkers, and the additional traits, that are useful to gain qualitative insights into the various forms of eWork.

On the basis of the indicators selected a questionnaire was put together and tested on 718 workers in Belgium, Italy, Hungary and Great Britain.

In the case of the pilot inquiry the cross-tabulation approach proved to be highly productive as the combination of indicators allowed teleworkers to be detected as well as various typologies to be ascertained based principally on the locations where work was carried out and the extent to which working at a distance was systematic.

11.1 Introduction

11.1.1 Measuring telework: a definition problem

The multiple definitions used to describe telework have dominated the debate on this issue. This has inevitably had repercussions on the measurement of the phenomenon. To count teleworkers it is essential to agree on a definition since 'measuring telework is like measuring the length of a piece of elastic: it all depends on how taut it is' (Qvortrup, 1998). Some authors extend the concept of telework to all types of work done at a distance

1 The present article is the result of a collective effort of the STILE consortium. In the present article Giovanna Altieri edited the 'Introduction' and 'Conclusions', Francesca della Ratta 'Chapter 5' and Cristina Oteri 'Chapters 2, 3 and 4'.

even if the telephone is the only instrument used (De Masi, 1995);[2] others restrict telework to the case of employees with an exclusive contract (Bracchi & Campodall'Orto, 1995).[3]

The elements common to most definitions refer to an activity conducted in a place other than the traditional office with the systematic use of telecommunications.

These are elements which characterise the most well-known definitions at the European level, like the one of the International Labour Office of Geneva, that has defined telework as 'any form of work done at a place distant from the central office or from the production centre and which implies the use of new technology to permit working at a distance and facilitate communication' (Di Nicola, 1999), or like the one proposed by the European Foundation of Dublin 'Telework is any form of work conducted for an entrepreneur or a client by an employee or a freelancer or a homeworker which is done regularly and for a considerable amount of the working time from one or more locations other than the traditional workplace with the use of information and/or telecommunications technologies' (Blainpain, 1995).

The vast range of definitions proposed in the literature highlights the multidimensional nature of the phenomenon thus requiring the use of a set of indicators to measure and define it.

Such complexity derives from the fact that telework is not a type of work (nor a type of task or contractual form) but only one of the possible ways of conducting a wide range of jobs. It is thus a transversal concept which can accompany the definitions of forms and types of work but not substitute for them.

In recent years, various European research projects have produced more or less restrictive measurements of the phenomenon. Of these, one of the most prominent is the one proposed by the ECaTT project in 1999 which came up with an estimated nine million European teleworkers (six percent of the labour force). The EMERGENCE project, using a different methodology, based on triangulating the results of an employer survey with Community Labour Force Survey data, arrived at a similar estimate - that there were approximately nine million teleworkers in Europe in 2000 (Bates & Huws, 2002).

According to the Eurobarometer inquiry (2001), which used a more 'restricted' definition, the number of teleworkers is 5.4 percent of the European labour force (6.1 percent of men and 4.7 percent of women), although a good quarter of European workers showed an interest in this form of work. Using a 'broad' definition of remote working, however, the SIBIS project estimated that in 2002 the percentage of *e*Workers of the European labour force was approximately 13 percent, identifying three main types: home-based, mobile and *e*Work conducted by freelancers or SOHOs (Small Office/Home Office).[4]

If on the one hand figures on teleworkers in the strict sense of the term (telehomeworkers) are now lower than once thought, on the other hand, there is currently a 'contamination' of work forms which makes it more difficult to distinguish between traditional work and telework. ICT and the diffusion of flexible forms of work now permeate

2 Any activity conducted at a distance from the office or firm, even without the use of telematic instruments.

3 An activity which is defined as telework has the following features: a *relocation* of the activity with respect to the traditional workplace; *telematic instruments* are used to conduct work; the activity conducted at a distance is done *systematically*; there is a work relationship based on an exclusive contract.

4 Other data on telework in Europe are presented by J. Pratt in this same book.

all production sectors, to such an extent that in recent EU documents reference is made to *e*Work, rather than to telework, a term intended to denote 'any kind of work conducted from a remote location through the use of information and telematic technologies', including forms of co-operative work and virtual offices.

The development of Internet and ICT technologies enabled a shift of attention from the physical place where work is actually done (the telehomeworker's workstation), to the virtual environment (the network) where the work is shared, thanks to the increasing diffusion of groupware systems which facilitate co-operative work through the sharing of documents and calendars and the development of discussion forums which have started to become widespread even within traditional firms (for instance to aid the exchange of information between different offices).

There are evidently clear differences in the diffusion of types of *e*Work practices in different countries, which are shaped not only by the diffusion of technologies but also by differing regulative and cultural systems. Telehomeworking is common in North Europe (15-20 percent) whereas it is less so in Mediterranean countries (approximately five percent). Four percent of European workers are mobile *e*Workers. In general, *e*Work in Europe seems to be more common among the self-employed than employees; about 3.4 percent are self-employed *e*Workers.

The differing cultures and economies of European countries have correspondingly differentiated *e*Work practices. According to the results of the EMERGENCE project, the Netherlands is the country where Telehomeworking is the most widespread, to such an extent that one out of ten employers have adopted this work modality, perhaps due to the promotion of *e*Work following the introduction of a platform for the promotion of telework. In Denmark telework has been the focus of public debate and an innovative collective agreement has been signed which has contributed to making it the second country for its use. Lastly in Sweden, Finland, Austria, Belgium and England approximately three to four percent of employers make use of full-time telehomeworkers.

The eGap project (Como, della Ratta-Rinaldi & Di Nicola, 2003), which studied employers' attitude to telework, highlighted how employers were more inclined to use remote freelancers rather than teleworkers from within the firm. Yet numerous studies have demonstrated that telework is advantageous for the firm as it allows space to be saved and increases the productivity of personnel (Di Nicola, 1999). The most frequent reasons for resorting to telework are either specific personal requirements (maternity, disabled workers, caring for the elderly, moving house) or the necessity to entrust part of the work to external consultants. Research conducted on employers' attitudes to telework shows that there is considerable distrust (especially in small firms) of *e*Work, because it prevents the visual control of the workers, and introduces complex organisational variables, such as project work organisation, target-based assessment and planning of activities. It is firstly a problem of firm culture and only secondly of technologies and telematic connection systems.

The Lisbon strategy stresses the importance of creating not only 'more jobs' but also 'better jobs' and in European policies, *e*Work is closely linked to the development of a knowledge society (eEurope 2005, Action Plan). This is why research objectives in the next few years will not only be aimed at counting *e*Workers, but also at capturing the wider changes that ICT technologies are causing in work modalities, organisation and conditions. In fact *e*Work allows some company functions to be decentralised, to find resources

in places far from the main offices and to acquire greater flexibility in the management and organisation of work forms.

This brings both advantages and disadvantages for workers and work conditions which can be more or less accentuated depending on which occupational groups are involved. According to some experts,[5] some firms currently encourage a type of 'sick' telework whereby workers can be reached constantly by mobile phones whilst most reject 'healthy' telework (focussed on the workers' self-organisation).

The greatest risk of telework (or, better, *e*Work), is its potential to intensify some particular features of certain types of work. It can thus make the work of creative workers more productive but also invasive and activities that are already 'bitty' may become more fragmentary or isolating. It thus follows that there is a need for norms to regulate the phenomenon and protect the workers, especially those who do 'high risk' tasks, from isolation and overwork.

11.2 The STILE project and *e*Work

The aim of the STILE study on *e*Work was to identify comparable indicators that would be useful for measuring and monitoring the development of *e*Work and telework practices in employee surveys. Once the indicators for measuring telework were defined, questions were put together to be inserted into LFS questionnaires and pilot testing was conducted to evaluate these questions.

The first step was to discuss a set of indicators to be inserted into statistical inquiries on European labour forces. The technique for the administration of specific questions on telework was designed to follow the 'piggybacking' method, already experimented in the US and elsewhere as an effective method to reach, through a limited set of questions, a small population of workers that represent less than ten percent of the total workforce.

In the STILE project a strict definition of telework was not used because there is no general agreement on a definition and because new forms of work at a distance continue to emerge in an ever-evolving development of organisational practices. It is however opportune to give data users the freedom to use more or less rigid definitions of telework to quantify the phenomenon.

To select the indicators useful for describing *e*Working practices, it is necessary to clarify the definition of telework intended to be used.

The STILE definition of telework extends the concept to any occupation that uses telecommunication *links*, as long as they are performed *systematically* (full-time or part-time on a daily or weekly basis) and entirely or partly conducted *outside the traditional workplace.*

This means that telework may be performed at the worker's *home* (home-based), from a *location belonging to a third party* (such as customer premises) or from a *mobile station* (mobile telework).

5 See interview with Domenico de Masi (http://www.kataweb.it/lavoro/).

11.3 The cross-tabulation of indicators approach: pros and cons

Which strategy should be used to detect teleworkers in a broad statistical survey? At least two quite different options are feasible:
- providing respondents with an exact definition of telework and asking them if they could categorise themselves as practising this work form;
- identifying teleworkers through an 'ex post' combination of different indicators on the main features of the phenomenon.

The first strategy, which has until now been most widely used in general population surveys,[6] is easier to use but some problems do emerge in its application.

The first is the difficulty of choosing one from the many definitions of telework available since any choice is bound to restrict or broaden the field of inquiry, whilst constraining the users' requirements for flexibility.

Furthermore, if a specific definition is proposed, the respondents may be influenced by the social desirability/undesirability of their reply rather than give a true description of their situation.[7] Lastly, any definition eventually risks becoming obsolete, compromising the continuity of future surveys.

During the project this effect occurred during the pilot survey conducted in Hungary. The pilot was conducted by the Hungarian Central Statistical Office, within the LFS.

Given the very large size of the sample, the Hungarian team decided to precede the telework module by a filter question which asked the respondents if they could recognise themselves in the definition of teleworker presented.

The subsequent control questions then demonstrated that a large percentage of those who declared themselves to be teleworkers did not in fact actually match any of the prerequisites. It thus seems that the respondents either had a poor familiarity with the term 'telework' or were anxious to please the interviewer by giving an affirmative answer.

It is also possible that the exact opposite may occur: some professionals (especially men) who practice forms of telework may conceal it for fear of being categorised as a homeworker, a status which they may regard as less prestigious.

With the cross-tabulation (of indicators) approach it is not necessary to ask respondents whether they consider themselves to be teleworkers as this can be discerned by combining several indicators on the main aspects of telework. Such a combination also allows different typologies of teleworkers to be detected and characterised and the adaptation of statistical data to specific user requirements.

The aspects that are essential for identifying teleworkers are those mentioned in the vast majority of definitions of telework: the place where the worker carries out his job; the amount of time spent working at a distance from the main office; and the importance of the use of information and telematic technologies.

The work location can be considered to be one of the most important discriminating elements of telework. In fact this indicator allows a distinction to be made between a telehomeworker (or home-based teleworker) and a teleworker who works on the move (a

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6 This approach is the one used by Empirica to conduct the ECaTT inquiry, which provided the most reliable estimates on the phenomenon in Europe (1998).

7 On the risks of inadequate replies to questions to which respondents do not have a precise opinion, see Pitrone (1996) and Gobo (1997).

mobile teleworker) or from a telecentre. Such an important indicator should distinguish between those who work exclusively from home, a telecentre, customers' premises or a mobile workstation as well as those who work from both the main office and outlying branches or other locations, including their homes.

The amount of time spent working away from the main office allows the frequency of telework to be identified, and a distinction to be made between regular and occasional teleworkers (supplementary teleworkers). The threshold generally advised to distinguish between these two types of teleworkers is at least one whole day a week spent teleworking.

The amount of time spent working at a distance also allows a distinction to be drawn between permanent teleworkers (who spend at least 90 percent of working time conducted at a distance) and alternating teleworkers (ECaTT, 1999).

Lastly, the importance of ICT use allows telework to be distinguished from other home-based work (or work conducted from outlying branches) for which information and telematic instruments are not indispensable. This is surely the most complex dimension and moreover the one which is most susceptible to obsolescence. However, it can supply important information and allow a distinction to be made between various types of technical organisation or levels of interconnection between workers (online and offline), and between types of telework defined on the basis of various levels of importance of/ necessity for ICT tools.

The choice to identify teleworkers through a combination of different indicators makes data management more complex but it ensures that the final data are more adaptable to user requirements. Furthermore, the combination of the indicators ensures better results in comparative inquiries since it is easier to identify comparable indicators of the three dimensions rather than use a definition which is attributed the same meaning across differing economic and cultural contexts.

11.4 Significant indicators considered for the analysis of telework

On the basis of these considerations, the cross-tabulation (of indicators) approach was privileged through the creation of a set of indicators. The multidimensionality of the phenomenon clashes with the need for 'parsimony', typical of large statistical inquiries like European surveys on the labour force. Given that it might only be feasible for very few questions to be added to the questionnaires, a distinction was made between core indicators, necessary to detect teleworkers, and additional indicators, useful for supplying further descriptive information about these teleworkers and their work environments.[8]

The core indicators (four questions) in the first pilot test were related to the essential dimensions of the phenomenon and measure the *place* where the worker performs his/her working activity, the degree of *importance of information use and telematic technology* (the quota of time that the worker uses a PC and is online, the *kinds of technologies used* and who provides these technologies) and the *quota of working time* spent on work at a distance.

8 The indicators, tested during the pilot survey in the STILE project, were represented with some changes as a final product of the STILE study on eWork in the form of recommendations for surveying telework. This article refers to the final proposal of the project (della Ratta & Oteri, 2004).

In addition to these three dimensions, several additional indicators were selected on the 'work environment' of telework in order to provide descriptive information on the phenomenon:

- the kind of activity done from a distance (open question with list);
- the motivation for teleworking (to finish or catch up with work; to avoid interruption; because of a bad working environment or bad working relationships; required by job or employer; to co-ordinate your work schedule with personal or family needs; experimentation; to reduce commuting time or expense; health reasons; for greater autonomy or independence);
- who initiated the arrangement (the employer, the worker, both);
- whether teleworking is a formal or informal arrangement;
- reversibility (to have the opportunity to discontinue the telework experience);
- assessment on health and safety of work;
- assessment on work pressure since starting to telework.

After completing the pilot test, the research group proposed a new ad hoc module of six indicators (and relevant questions) referring to the three main dimensions of telework (place, time and technology). These questions allow the interviewer to ascertain whether the respondent can be considered a teleworker. Those who get past the filter question can be asked more detailed questions.

The proposed indicators are as follows:

1a. Use of computer for main job. (Do you use a computer for your work?) (yes/no question to all respondents) [FILTER QUESTION]

2a. Use of Internet and electronic mail for main job. (Do you use the Internet or email for your main job?) (yes/no question to all respondents)

2b. Workplace. (In the last four weeks, have you carried out work at any of the following places?) (multiple option question to all respondents)

1. In your own home
2. At locations belonging to a third party (such as customers' premises)
3. On the move (while travelling)
4. In more than one location belonging to customers or clients
5. Other places different from traditional workplaces (hotels, conferences, etc.) (specify: _____)
6. In more than one location belonging to your employer [if not a teleworker - stop questionnaire]
7. At just one location belonging to your employer [if not a teleworker - stop questionnaire]
8. Other traditional workplaces (specify: _____)

2c. Time spent working at a distance. (In the last four weeks, approximately how many hours a week, on average, did you spend working at a distance (from your employers' premises)?)

2d. Use of computer for work at a distance. (Do you use the computer for work conducted at a distance from the main office?) (yes/no question)
Would it be possible to work in this way without the technology? (yes/no question)

2e. Use of Internet and electronic mail for work at a distance. (Do you use the Internet and electronic mail for work conducted at a distance from the main office?) (yes/no question)

The order of the questions may be adapted to suit the context of the specific inquiry. In the case of very large samples two simple filter questions can be inserted to ascertain the general use of the computer and Internet at work (1a and 2a), before going on to questions targeted at determining the working conditions of teleworkers. It is also necessary to ascertain whether telematic technologies are actually used in the case of work at a distance to distinguish between teleworkers and other homeworkers. Of course, the filtering power of a question on the use of the computer at work is destined to decrease in importance over time, even if information on the characteristics of those who use the computer and Internet for work has a relevance which goes beyond the debate on telework. How these technologies are used can be ascertained through further questions.

Information obtained in such a way can be enriched with other indicators which allows the characteristics of teleworkers to be investigated more thoroughly. The research team selected seven which had given the most significant results during the field research:

- intensity of work at a distance;
- the means used to transfer the results of work (personally, post, courier, fax, telephone, email, Internet, software for remote collaboration, other);
- equipment used when working at a distance (computer, email, telephone, fax, Internet, intranet, software for remote collaboration, other);
- who initiated the arrangement (employer, worker, both);
- whether the arrangement is formal or informal;
- reversibility (to have the choice of ceasing to telework);
- assessment of changes in work pressure since starting to telework;
- motivation for teleworking (to finish or catch up with work; to avoid interruption; because of a bad working environment or bad working relationships; required by job or employer; to co-ordinate the work schedule with personal or family needs; experimentation; to reduce commuting time or expense; health reasons; for greater autonomy or independence).

The first three indicators are particularly useful because they supply additional information on the use of ICT. Further information on teleworkers can be obtained from the intensity of their connection (occasional or constant connection), on the means used to deliver the work or on the technologies used. The next three indicators are useful for employees to ascertain the type of agreement which regulates telework, whereas the indicator on judgement regarding changes in work pace is useful as a control indicator to assess the impact on work performance and stress of this form of work. A thorough investigation aimed at considering the impact of telework not only on working life but also on other aspects (use of time, sleep, stress, family relations, social relations etc.) was not considered here because such topics are too subjective for an official statistical survey.

Lastly, of the other indicators considered by the team, it is worth noting the room in the house that is used for teleworking (whether or not there is a specific room for work); the type of activity conducted in the telework mode (cognitive or communicative tasks), the ownership of the teleworking technology (does the equipment belong to the worker or the employer?), and the amount of the time spent working at a distance dedicated to activities which require the use of a PC and the Internet.

In the pilot inquiry, the cross-tabulation approach proved to be highly productive since the combination of indicators allowed for the identification of teleworkers as well as

making it possible to construct various typologies of teleworking based principally on different types of workplace and patterns of working at a distance, as illustrated below.

11.5 The results of the pilot inquiry

11.5.1 The sample

The pilot testing of the *e*Work module was carried out in the countries involved in the STILE project (Belgium, Hungary, Italy, Ireland and the United Kingdom). The configuration of the pilot testing differed from country to country, depending on national opportunities.

On the basis of the indicators selected in the first phase of the project, a questionnaire was put together which was tested on 718 workers in Belgium, Italy, Hungary, and the United Kingdom (Table 11.1).

These questionnaires were composed of the most relevant LFS indicators, the common core indicators on *e*Work and, depending on national features, additional and more detailed questions on the commonly agreed indicators. In some countries additional issues were dealt with in the questionnaire. In Hungary, the pilot test was carried out as an *ad hoc* module added to the quarterly LFS. This was an important test, allowing the module to be tested in a 'real' LFS context.

Ireland seized an opportunity to test an *e*Work module within the context of the Irish Quarterly National Household Survey (QNHS). For this pilot test the existing UK *e*Work indicators (also based on the cross-tabulation approach) were adapted slightly, to adjust for the technological developments that had taken place since they were first used in 1997, and attached to the QNHS. In addition to this, the Irish partner agreed to carry out a small-scale test of the commonly agreed STILE *e*Work indicators, in order to be able to fine-tune the wording to fit the local language and culture.

Before describing the characteristics of the STILE sample it is useful to reiterate that the objective of the project was not to measure the extent of telework but to identify the indicators that allow it to be measured and to gather some qualitative characteristics.

In short, the pilot inquiry was aimed at testing the validity of a research instrument, its comprehensibility and ease of use but also its success in capturing the range of indicators previously identified by the STILE partnership.

When putting together the sample, an attempt was made to ensure the typological representation of the population under analysis (workers and *e*Workers), and to include a sufficient number of *e*Workers to allow the functioning of specific questions on telework to be tested.[9]

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9 The best solution to meet such an objective was to divide up our sample of two hundred units, as outlined in the initial phases, between workers and *e*Workers. If we had opted for a random sample of workers, we would have had little possibility of obtaining a sufficient number of *e*Workers to test the validity and reliability of questions on telework. If on the other hand, we had interviewed only teleworkers, we would not have had the opportunity to test how the questions are perceived and understood by the general public. Moreover, the core indicators could reveal new forms of work if they were also asked to people who do not work in a typical form of telework.

Table 11.1 Samples of workers and *e*Workers

	Workers	*e*Workers	Total
Belgium	79	97	176
Italy	100	100	200
UK	101	101	202
Hungary	-	-	140
Total	280	298	718

Source: Data of STILE pilot study on telework, 2002, processed by IRES

It was thus decided to interview one hundred randomly selected workers and one hundred known teleworkers, without dismissing the possibility of finding teleworkers among the hundred randomly-selected workers interviewed. For the two subgroups we pursued two different sampling methodologies, with some differences in the various national contexts (see Bates et al., 2002).

Whenever available, specific lists of practising or aspirant teleworkers were used, in other cases a snowball sample method was applied as illustrated in detail in the individual national reports (see Bates et al., 2002). Table 11.1 shows the number of interviews conducted in the various countries.

11.5.2 Developing a typology of teleworking

As already mentioned, it is not possible to differentiate teleworkers through a single question, given the multidimensional nature of the phenomenon. It is thus necessary to combine various questions. Having said this, it would be possible from the juxtaposition of location, technology and intensity to derive many different definitions of 'teleworkers', '*e*Workers', 'mobile workers', 'multilocational workers' or 'occasional teleworkers' that would allow researchers to address quite different policy issues.

From the data surveyed during the inquiry, it was decided to come up with a typology useful to categorise the teleworkers based on the workplace and the intensity of working at a distance. Variables on the use of technologies were used only as a filter to distinguish the 'real teleworkers' from those who work in a place other than the traditional office but without the help of ICT technologies (door-to-door sales representatives, tailors, refuse collectors, drivers, etc.).

In interpreting the results, the first task was to analyse the combinations of the various workplaces mentioned by the respondents, illustrated in Table 11.2. Of those who supplied only one reply it is possible to distinguish between: *traditional workers*, or non-teleworkers, those who report that they work exclusively from the employer's premises; *mobile workers*, distinguishing between those who use ICT technologies (mobile teleworkers) and those who don't (mobile workers); and *telehomeworkers* who describe themselves as working exclusively from home.

In at least a third of the cases, however, the replies were not so easy to interpret because the respondents indicated more than one workplace, declaring that they worked

in their office but also at home or on the move or at the client's premises, highlighting the increasingly multilocational character that many occupations are taking on.

The individuals who gave mixed replies have been called '*multilocational eWorkers*,' a type of teleworker or *e*Worker that can be added to the more traditional *telehomeworker* and *mobile teleworker*. As seems to be emerging in the countries in question, a new type of *e*Worker is becoming more common, superimposing itself onto the classic division between the telehomeworker, mobile teleworker and the telecentre worker.

Changes have occurred in the way these workers operate, allowing them to conduct part of their work at a distance without completely transforming their work into full-time telework (for example due to family problems, maternity, transferrals, etc.). In some cases the work relationship is formalised as alternating telework, a practice which has been on the rise in recent years; in other cases the characteristics of the work make it possible to choose the workplace on the basis of various requirements, both work-related and unrelated.

Table 11.2 Combination of workplaces - results of pilot

	Belgium		Italy		UK		Hungary	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Traditional workers	58	33.0	94	47.0	39	19.3	10	7.1
Mobile but not teleworkers	-	-	6	3.0	-	-	-	-
Mobile workers	5	2.8	0	0.0	3	1.5	4	2.9
Telehomeworkers	18	10.2	26	13.0	21	10.4	21	15.0
Mobile and remote workers	28	15.9	20	10.0	19	9.4	17	12.1
Stationary and remote workers	26	14.8	48	24.0	16	7.9	57	40.7
Stationary and mobile workers	27	15.3	0	0.0	13	6.4	13	9.3
Stationary, remote and mobile workers	14	8.0	6	3.0	91	45.0	10	7.1
No answer	-	-	-	-	-	-	8	5.7
Total	176	100.0	200	100.0	202	100.0	140	100.0

Source: Data of STILE pilot study on telework, 2002, processed by IRES

Using the temporal variable (the amount of time spent working at a distance) it is possible to further refine the typology. Those who reported working from a remote location for less than 20 percent of working time were considered to be occasional teleworkers, whereas the others were considered to be stable, producing the theoretical typology shown in Table 11.3.

To sum up, using the questions proposed in the adapted module, the following process was used to construct the typology:

- analysis of the combination of work locations: this operation is aimed at constructing a typology of teleworker based on the work location(s) the respondent worked from during the reference period. To this question it is possible to supply more than one

answer. In order to ensure sufficient cell sizes for any analysis, there is a need to aggregate some of the locations;
- by combining the answers it is possible to detect four types of workers: the stationary workers who work only at their employer's location, the mobile workers who work exclusively 'on the move', the workers who work exclusively from remote stations (either from home or from another remote location), the multilocational workers who work from some combination of mobile locations, remote stations, and their employer's location (see Tables 11.2 and 11.3);
- labelling workers who declared that they worked only in traditional locations as 'non-teleworkers' (CATI programme can do this automatically);
- calculation of the percentage of hours worked at a distance out of the total hours worked in the last week and the aggregation of the variables into two groups, from 100 percent to 20 percent and from 20 percent to zero percent;
- distinction between occasional and stable types of teleworkers (see Table 11.3).

Table 11.3 Typology of individualised *e*Work

More than 20% of the time worked at a distance out of total time worked during last week	Less than 20% of time worked at a distance out of total time worked during last week
Telehomeworker	Occasional telehomeworker
Multilocational *e*Worker	Occasional multilocational *e*Worker
Mobile *e*Worker	Occasional mobile *e*Worker

Obviously this strategy is only one of many possible methods of classifying teleworkers: other combinations can be determined by modifying the aggregations of the variables obtained with the combination of the work locations or by modifying the threshold for the definition of occasional workers, by using the information on the technology used to further define the teleworkers or by cross-tabulation with other variables such as occupation, sector or employment status.

Table 11.4 Combination of workplaces to obtain the STILE typology of workers

Typology	Possible answers	Kind of workers
Traditional workers (stationary workers)	'In more than one location belonging to your employer' *and/or* 'At just one location belonging to your employer' *and/or* 'Other traditional workplaces'	Non-teleworkers
Mobile workers	'On the move (while travelling)' *and/or* 'At locations belonging to a third party'	Mobile workers
Telehomeworkers	'In your own home'	Telehome-workers

Table 11.4 Combination of workplaces to obtain the STILE typology of workers. Continued

Typology	Possible answers	Kind of workers
Mobile and remote workers	'On the move' *and/or* 'At locations belonging to a third party' *AND* 'In your own home'	Multilocational *e*Workers
Stationary and remote workers	'In more than one location belonging to your employer' *and/or* 'At just one location belonging to your employer' *and/or* 'Other traditional workplaces' *AND* 'In your own home'	
Stationary and mobile workers	'In more than one location belonging to your employer' *and/or* 'At just one location belonging to your employer' *and/or* 'Other traditional workplaces' *AND* 'On the move (while travelling)' *and/or* 'At locations belonging to a third party'	
Stationary, remote and mobile workers	'In more than one location belonging to your employer' *and/or* 'At just one location belonging to your employer' *and/or* 'Other traditional workplaces' *AND* 'In your own home' *AND* 'On the move (while travelling)' *and/or* 'At locations belonging to a third party'	

In the inquiry conducted (718 people interviewed) the distribution of the types is reported in Figure 11.1.

It should be emphasised that this is *not* based on a random sample so the breakdown cannot be extrapolated to the general population. The typology shown is one of many that can be applied to new forms of work. Our recommended strategy for collecting data in objective terms makes it possible to define teleworkers in different ways that correspond to various policy questions, which could involve issues related to labour, transportation, diffusion of technology or other issues.

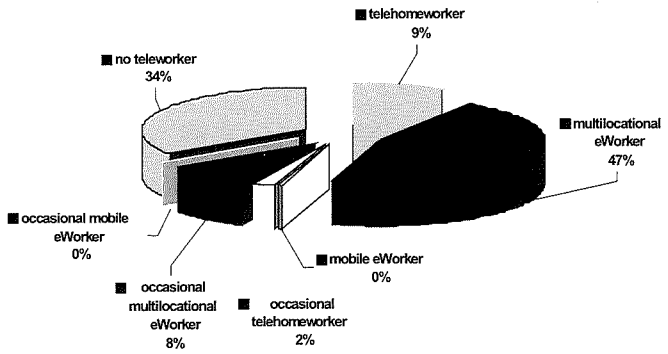

Figure 11.1 The STILE typology: breakdown found in pilot (Belgium, Italy, UK and Hungary)

11.5.3 Other possible derived typologies

Based on the actual policy interest or research question, other typologies are possible. Because there is no absolute, agreed-upon definition of telework, we recommend the collection of data in objective terms. This strategy permits teleworkers to be defined in a variety of ways that correspond to differing policy questions, which could involve labour issues, transportation, diffusion of technology or others. Table 11.5 illustrates definitions of telework that can be derived from data such as that collected in the Quarterly Household Survey of Ireland.

The Irish survey uses the CLFS homework question 'Do you work from home?' with 'usually', 'sometimes' or 'never' as answer categories. In the next chapter of this reader, Joanne Pratt discusses how these data can be interpreted to provide widely differing estimates of teleworking in response to differing policy interests, ranging from 13.3 percent to 0.1 percent of the employed labour force, depending on how teleworkers are defined. This underlines the importance of specifying the definition in any analysis.

An important distinction should also be highlighted between the employed and the self-employed, as they have different contractual situations. For freelancers, working from home is a 'natural' consequence of their work autonomy, whereas employees need to stipulate a formal or informal agreement with their employer in order to work at a distance. Knowledge of the extent of the phenomenon among employees would allow an assessment of the employer's openness towards a form of work which still arouses diffidence - indeed many (especially in Italy) still consider it to be more suitable for freelancers (Como, della Ratta-Rinaldi & Di Nicola, 2003).

Table 11.5 Alternate derived definitions of telework in Ireland333

	Number	Percent of all in employment
Sample size	44,500	100.0
Persons in employment	1,795,000	100.0
1. An employed person who does any work at home	238,100[1]	13.3
1a. An employee who does any work at home	66,500	3.7
1b. A self-employed person who does any work at home	159,900	8.9
2. An employed person who does any work at home using a computer with a telecommunications link	65,400	3.6[2]
3. An employed person who could not work at home without a computer and telecommunications link	40,800	2.3[3]
4. An employed person who works in multiple locations using home as a base	34,100	1.9
5. An employed person who works in multiple locations using home as a base and uses a computer and telecommunications link	5,700	0.3
6. An employed person who works in multiple locations using home as a base and could not work at home without the use of a computer and telecommunications link	2,500	0.1

[1] Includes persons who work at home assisting relatives.
[2] 27.5 percent of persons who work at home.
[3] 62.4 percent of those who work at home with computer and telephone.
Source: Irish Quarterly National Household Survey Q3 2002

11.6 Conclusions

The telework module may easily be added as an ad hoc module to existing LFS, but it could be useful also for other general surveys addressing changes at work, at whatever level (sectoral, regional, or national).

The 'piggybacking strategy' (Pratt, 2001) is an excellent tool to obtain a great deal of information on *e*Workers. In fact the test showed that the cross-tabulations, with a large variety of characteristics on the labour force obtained in this survey, allowed a lot of new information on telework to be generated and the characteristics, similarities and differences between various types of teleworkers to be investigated. To cite some examples, the telework module can be cross-tabulated with gender, age, educational level, professional status, occupation, working time, atypical work, etc.

Combining indicators also allows different types of ICT-mediated distance work to be discerned, while variations in the combinations of these indicators bring into view a broad range of *e*Work forms.

As previously demonstrated in the STILE project, a typology was developed based on the various places where employees worked. The use of ICT and the intensity of working at a distance refine the typology.

Even though the questionnaire was tested on a sample which is not representative of the population as a whole, the results of the inquiry do show that multilocational *e*Work is an emerging type of telework superimposing itself on the classic division between the telehomeworker, mobile teleworker and the telecentre worker.

Even though only a pilot test was conducted in the STILE project, the results have been corroborated by recent research projects on telework (SIBIS, EMERGENCE). The results of these researches seem to demonstrate that alongside the figure of the telehomeworker, whose number is not expanding spectacularly, the mobile, nomadic or multilocational *e*Worker is becoming increasingly more widespread, alternating working from the office, home, on the move or from customers' premises in response to personal and work requirements. Mixed forms of telework may also be increasing because alternating between home and office seems to be a solution to some of the problems of telework, like isolation (social or organisational) and the poor visibility in the firm of those who work at a distance. The EMERGENCE project for example reports that almost half of the establishments interviewed practice some kind of *e*Work, although only a small minority employ telehomeworkers.

An important conclusion is that a narrow definition of *e*Work referring to the 'traditional' full-time telehomeworker does not reflect real tendencies. Outsourced forms of *e*Work are more common than telehomeworking, so much so that the multilocational *e*Worker seems to be the dominant contemporary type of *e*Worker.

The consequences of such a result are relevant for statistical measurement strategies of the *e*Economy: if *e*Work is no longer an isolated phenomenon involving a small minority of workers, but rather an experience involving a growing proportion of workers, it becomes ever more important to monitor its progress, even if changes produced by new technologies on work organisation, methods and forms are impossible to capture at the statistical level. For such variable and differentiated forms of *e*Work, a flexible measurement strategy, like that of the cross-tabulation (of indicators) approach seems to be the most appropriate.

The statistics users who commented on the questionnaire underlined the necessity to ask additional questions on the positive or negative aspects of telework. The following positive aspects were mentioned: benefits for the family, better time management, autonomy, possibility to work better avoiding bad office relations, the opportunity to recuperate social relations and, above all, time-saving benefits which allow a better balance between work and family responsibilities. Among negative aspects, much reference was made to loneliness, isolation or a sense of abandonment of the teleworker, fewer career opportunities for those who decide to work from home, technological difficulties encountered, overwork provoked by working at a distance and difficulties separating work from private life.

There were also some respondents who suggested that it would be a good idea to look into teleworkers' satisfaction levels, at the resulting improvement of work quality and at the importance of incentives to increase the diffusion of this form of work.

Lastly, for the choice of the basic questionnaire, it is important to be aware that the decision to include an add-on module is often a political one. It depends on the general context of the survey, the socio-economic circumstances and the interests of influential policymakers. This means that, in order for it to be adopted widely, it is important to convince influential decision makers of the importance of the *e*Work module, which requires extensive knowledge of the objectives of the organisation concerned.

This is of special importance in the case of promoting an *ad hoc* module to the LFS, as there is a high demand from many quarters for the inclusion of *ad hoc* modules. As the main European instrument for capturing information on all aspects of the labour force, this survey has to satisfy the interests of an exceptionally broad range of influential policy interests.

Some practical points need special attention when adding an *ad hoc* module to an existing questionnaire. The experience of the STILE pilot has demonstrated that a module should be composed of:

- a limited list of core indicators that can be translated into simple questions;
- a list of relevant additional indicators that allow the user to choose certain indicators that may be of interest within the specific context of the survey;
- the list of reply categories should bear in mind the consequences for the resulting number of variables and the related data processing burden;
- the specific wording of the questions should be adapted to the general character of the survey concerned;
- the routing of questions depends on the objectives, the target group, the composition, etc. of the basic questionnaire. Specific attention should be paid to the impact of the order of questions on the interviewer burden and on the kind of respondents that should answer any specific question;
- the inclusion of the module should not change the authorised questionnaire.

Appendix: Proposal of ad hoc module for *e*Work

a) eWork questions

a1) Do you use a computer for your work?

1. Yes
2. No [FILTER QUESTION: stop questionnaire]

a2) Do you use the Internet or email for your main job?
1. Yes
2. No

a3) In the last four weeks have you carried out work at any of the following places? *(Multiple answer.)*
1. In your own home
2. At locations belonging to a third party (*at customer premises*)
3. On the move (*while travelling*)
4. In more than one location belonging to customers or clients
5. Other places different from traditional workplaces *(hotels, conferences, etc.)* *(specify: _____)*
6. In more than one location belonging to your employer [not a teleworker - stop questionnaire]
7. At just one location belonging to your employer [not a teleworker - stop questionnaire]
8. Other traditional workplaces *(specify: _____)* [not a teleworker - stop questionnaire]

a4) In the last four weeks, approximately how many hours a week, on average, did you spend working at a distance (from your employers' location)[10] [or: at locations selected in question a3]?
_____ (Proportion *of hours a week spent on distance work can be calculated using total hours worked in week*)

a5) Would it be possible to work in this way without the technology?
1. Yes
2. No

b) Additional questions

b1) When you work at a distance (from your employer's location), how often are you connected to your company or customer?

	Phone connection	*Data connection*
1. The whole working day	□1	□1
2. Several times a day	□2	□2
3. Once a day	□3	□3
4. At least once a week	□4	□4
5. Less than once a week (occasionally)	□5	□5
6. Never	□6	□6

b2) When you work at distance (from your employers' location), do you transfer work results in the following ways: [multiple response allowed]
1. personally

10 In self-employed questionnaires it is better to omit 'from your employers' location'; so in following questions the expression is bracketed.

2. post or courier
3. fax
4. telephone
5. email
6. Internet
7. software for remote collaboration
8. Other, specify (_____)

b3) Which of the following list of equipment do you use when you work at a distance (from your employer's location)? *(Multiple answers are possible.)*
1. Computer (desktop or laptop)
2. Email
3. Telephone
4. Fax
5. Internet
6. Intranet
7. Software for remote collaboration (groupware)
8. Other, specify (_____)

b4) Who initiated the arrangement for working at a distance? [only employees]
1. Employer
2. Yourself
3. There is no arrangement
4. Other, specify (_____)

b5) Is the arrangement to work at a distance from your employer's location a formal or an informal initiative? [only employees]
1. Formal: there is a written agreement *(go to question b5.1)*
2. Informal
3. Don't know

b5.1) Under this agreement can you stop working at a distance? [only employee] *(Only if respondent answers 1 to question b5)*
1. Yes if I want
2. Yes, but it depends on my employer
3. Yes, but only at the end of the agreement
4. No
5. Other, specify (_____)

b6) What is the main reason for working at a distance (from your employer's location)? *(only one answer)*
1. Finish or catch up with work
2. To avoid interruption
3. Because of a bad working environment or bad working relationships
4. Required by job or employer
5. To co-ordinate your work schedule with personal or family needs
6. Experimentation

7. Reduce commuting time or expense
8. Health reasons (your own physical condition)
9. For greater autonomy or independence
10. Some other reason - please specify (_____)

b7) Do you want to continue working at a distance (from your employer's location)?
1. Yes
2. No

b8) Since you began working at a distance (from your employer's location), has your level of work pressure changed?
1. More work pressure
2. Less work pressure
3. As much work pressure as before
4. Don't know
5. I can't judge because I don't have any other experience to draw on

c) Other questions

c1) If you work from home, in which room do you work? (only if respondent chooses answer 1 to a3 question)
1. Study
2. Living room
3. Bedroom
4. Kitchen
5. Other

c2) Who provides the ICT equipment used for working at distance? [only employees]
1. Employer
2. Respondent
3. Both
4. Third party (specify)

c3) When you work at a distance (from your employer's location), what proportion of that time do you use a PC?
_____ % of the time worked during an average day

OR

____ fraction of the time worked during an average day

c4) Have you used the Internet for the following work-related activities?
- Looking for a job/sending job applications ☐1
- Finding information relating to your work/business ☐2
- Sending work to the workplace ☐3
- Accessing files on the employer's server ☐4
- Communication (including email) ☐5
- Other work-related activities (specify: _____) ☐6

c5) How is your work controlled when you work at a distance from your employer's location? [only employees] (maximum 2 answers)

Supervision:

- direct supervision □1
- automatic recording of performance □2

No direct supervision but:

- delivery of output within specified deadlines □3
- definition of individual goals □4
- definition of team goals □5
- other, please specify (_____) □6

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12 Telework: the latest figures and what they mean[1]

JOANNE PRATT

Abstract

The STILE project has developed a module for collecting reliable and comparable data about telework. The questions can be inserted into existing surveys. Because there is no agreed-upon definition of 'eWork' or 'telework,' the approach recommends asking a series of objective questions that pinpoint the location and frequency of work conducted at a distance from the employer. Telework or eWork can be defined at the time of data analysis, by selecting criteria that are meaningful to the research objectives.

This paper compares data collected from official Labour Force Surveys conducted in Hungary, Ireland, the Netherlands, the United Kingdom, and the United States. The variations in the ways each survey adapted the STILE-type module are discussed.

The STILE approach to measuring eWork will aid policymakers in following the growth of the trend in which workers use new technologies to work at locations distant from their employers' premises. The paper concludes with recommendations for adopting the STILE approach.

12.1 Measuring telework

12.1.1 The problem

The new pattern of work labelled 'telework' has no agreed-upon definition. The STILE telework research found that 'one approach focuses on home-based telework; another defines telework as any work mediated by ICTs; whilst others concentrate on mobility and the ability to work "anytime anyplace", perhaps in addition to a normal office day.' (Bertin, Bollen, Huws & Ramioul, 2003). Without a common meaning it is very difficult to compare numbers of teleworkers. Clearly another approach is needed.

12.1.2 The STILE-recommended solution: piggybacked module

The STILE approach recognises that one question cannot capture telework. However, it is possible to construct a range of specific typologies when a short series of objective questions is asked, which will be discussed below. The topics essential for defining telework include use of technology, location, and frequency of work conducted at a distance from the employer. Definitions relevant to the objectives of any particular survey are derived at

1 This paper would not have been possible without the generous contributions of survey questions and cross-tabulated data from Monique Ramioul (Belgium), Judit Lakatos and Éva Szilágyi (Hungary), Nicola Tickner (Ireland), Francesca della Ratta (Italy), Amelia Román and RTAM (Rob) Grim (The Netherlands), Peter Bates and Ursula Huws (UK) and Karen Kosanovich (USA).

the time of analysis. A substantial benefit is that questions can be added to an existing survey, such as a Labour Force Survey (LFS) by a process that is called 'piggybacking.' The responses can then be cross-tabulated with all of the demographic and other information that the survey includes.

12.1.3 Analysis of nested questions

The STILE-recommended methodology also emphasises that this module can be applied as a series of nested questions. For example, at the first, most general level, the question 'Do you use a computer for your work?' provides simple yes/no responses that can be compared across all surveys. When there is a significant incidence of computer use, for instance, a series of additional, nested, questions can be asked that probe in more detail into the use of a telecommunications link, access to the Internet and type of Internet connectivity.

This paper first illustrates the nested questions approach by comparing teleworker counts derived from LFS conducted in Hungary, Ireland, the United Kingdom and the United States. Data collected from the Netherlands are also described. As another way to analyse the data, participation rates by sex and job classification are calculated for three countries. Examination of national definitions of telework, which helps answer the question 'Who are the "real" teleworkers?', is followed by examples of applications of the data to related policy issues. The degrees to which the national surveys resemble the STILE module are then discussed. Finally, cautions and recommendations for collecting telework data in the future are given.

12.2 Results: the latest figures from national Labour Force Surveys

12.2.1 Work at home

Table 12.1 compares data from Labour Force Surveys conducted in Hungary, Ireland, the UK and the USA. Empty cells indicate that the data were not collected or cross-tabulated data were unavailable.

The incidence of employed persons who do *any* work at home as part of their job (Definition 1) ranges from nine percent in Ireland, and 11 percent in the UK to 19 percent in the USA. Fewer individuals in each country do so using technology. Employed persons using technology to work at home (Definition 2) varies from 1.7 percent in Hungary, to 3.6 percent in Ireland, five percent in the UK and 11.4 percent in the US. Interestingly, with the exception of Ireland, greater numbers of employees than self-employed work at home.

Equivalent cross-tabulations of data for the Netherlands were not available to present in Table 12.1. However, an ICT module included in a Dutch OSA survey provides insights into the use of technology and work at home.

Eighty five percent of employed persons 'had used a computer during the past four weeks'. Three-quarters of men and about one-third of women used a computer at home at least once a day. The Dutch also have a high degree of Internet use, implying that their labour force is well equipped for working at home. In fact, 73.4 percent of employees and six percent of the self-employed answered 'yes' to ever working at home in their current job.

Table 12.1 Telework incidence from national Labour Force Surveys

Telework definition	Hungary 2003 Farm + non-farm		Ireland Q3 2002 Non-farm		UK 2003		US 5/2001 Non-farm	
	(Thousands)	Percent of all in employment	(Thousands)	Percent of all in employment	(Thousands)	Percent of all in employment	(Thousands)	Percent of all in employment
Persons in employment	3,921.8		1,676.5[b]	100.0	27,294	100.0	131,803	100.0
1. An employed person who does any work at home	Q9A1+2[a]		149.5[c]	8.9	3,034[d]	11.0	25,000[f]	19.0
1a. Employee			62.0	3.7	1,513	5.5	18,394	14.0
1b. Self-employed			83.4	5.0	1,512	5.5	6,559	5.0
2. An employed person who does any work at home using a computer with a telecommunications link	66.1	1.7	59.9	3.6	1,455	5.0	14,987	11.4
2a. Employee	48.8	1.2	27.8	1.7	891	3.3	11,212	8.5
2b. Self-employed	17.3	0.4	31.2	1.9	565	2.0	3,759	2.9
3. An employed person who could not work at home without a computer and telecommunications link	---	---	39.2	2.3	1,218	4.4	---	---
4. An employed person who works in multiple locations using home as a base	---	---	---	---	HOME/ HOMD=3[e]		13,704[g]	10.4
5. An employed person who works in multiple locations using home as a base and uses a computer and telecommunications link	---	---	---	---	HOME/ HOMD=3 AND teleqa = 1[e]		8,481[g]	6.4
6. An employed person who works in multiple locations using home as a base and could not work at home without a computer and telecommunications link	---	---	2.5	0.1	HOME/ HOMD=3 AND teleqa = 2[e]		---	---

[a] See Table 12.4A; data unavailable.
[b] Includes full and part-time work.
[c] 'Usually' (85 thousand) + 'sometimes' (65 thousand).
[d] Works 'mainly' or 'at least one FULL day' at home.
[e] See Table 12.4D; data unavailable.
[f] Any amount of work at home.
[g] Estimate based on worked partly at home.

Source: Irish Quarterly National Household Survey Q3 2002, USA Current Population Survey May Supplement 2001, Hungarian LFS 2003, UK LFS 2003

Of employed respondents who had used a computer during the past four weeks, 91 percent of Dutch men and 84 percent of Dutch women had also used the Internet.

Counting the workers who had used a computer during the past four weeks and sometimes work at home, 93 percent indicated they needed ICT hardware. Dutch researchers define these persons as the 'real teleworkers among "homeworkers"'. They correspond approximately to item number 3 in Table 12.1.

12.2.2 Work at multiple locations

Because survey questions were asked in different ways, work in multiple locations cannot be directly compared. For example, 10.4 percent of US employed persons work in multiple locations using home as a base (Definition 4); 6.4 percent also use, but may not require, a computer and telecommunication link (Definition 5). The Irish question is more restrictive; it counts only the 0.1 percent who *require* the technology and link to work in multiple locations (Definition 6).

12.2.3 Work at home participation rates

Table 12.1 gave the incidence of any work at home. Table 12.2 shows that the incidence of work at home *at least one day per week* ranges from 8.9 percent of all employed persons in Ireland to 11.1 in the UK and 15 percent in the US. Fewer persons are *e*Equipped to communicate when they work at a distance: In Ireland, 3.6 percent of all workers work at home with a computer and telecommunications link; in the UK, 5.3 percent have a computer and phone; and in the US, seven percent of people work at home using email and/or the Internet. In each country there is a gender gap of about one percent: men who do any work at home are better *e*Equipped to work at home than women. The incidence ranges from four percent of Irish males who use technology for their work to 7.5 percent of US men and from 2.6 to 6.5 percent, respectively, for women.

More employees than self-employed work at home but that is because there are seven (Ireland and UK) to ten times (US) more employees than self-employed in the workforce. However, striking differences are found between the participation rates. Work at home by percent of category ranges from about four to 11 percent for employees and 40 to 48 percent for the self-employed. The figures suggest that in each of the three countries a large number of the self-employed operate their businesses from home. Similarly, the rates of technology adoption are greater for the self-employed than for employees. Fifteen to nearly 24 percent of the self-employed in the workforce are *e*Equipped compared with just two to five percent of employees.

Examining the data in another way, the differences are less extreme. Employees who work at home and use technology are found to be 58.8 percent of all work-at-home employees versus 37.4 percent of home-based self-employed who use a computer and telephone in Britain; 44.6 percent of employees and 37.4 percent of the self-employed in Ireland who use a computer and telecommunications link; and 45.6 percent of employees compared with 50.0 percent of self-employed in the US who use email and/or the Internet for their work.

Analysis of participation rates by these and other typical LFS questions helps identify the characteristics of persons who work at home. Detailed cross-tabulations of US labour

force data found that the most likely individual to work from home is a self-employed mother with a child under six years of age.

Table 12.2 Comparative rates of working at home at least one day per week

Ireland 2004	Total employed (thousands)	Work at home (thousands)	Work at home percent of category	Work at home with PC + link (thousands)	eEquipped percent of category
Employed persons	1,676.5	149.5	8.9	59.9	3.6
Males	936.2	101.1	10.8	40.5	4.3
Females	740.3	48.3	6.5	19.4	2.6
Employees	1,458.6	62.0	4.3	27.8	1.9
Self-employed	208.6	83.4	40.0	31.2	15.0
UK 2003	**Total employed (thousands)**	**Work at home (thousands)**	**Work at home percent of category**	**Work at home with PC + phone (thousands)**	**eEquipped percent of category**
Employed persons	27,294	3,034	11.1	1,455	5.3
Males	14,612	1,888	12.9	847	5.8
Females	12,683	1,137	9.0	608	4.8
Employees	23,995	1,513	6.3	890	3.7
Self-employed	3,300	1,512	45.8	565	17.0
USA 2001	**Total employed (thousands)**	**Work at home (thousands)**	**Work at home percent of category**	**Work at home with email + Internet (thousands)**	**eEquipped percent of category**
Employed persons	131,803	19,759*	15.0	9,266	7.0
Males	69,659	10,291	14.8	5,249	7.5
Females	62,144	9,468	15.2	4,017	6.5
Employees	119,399	13,856	11.6	6,323	5.3
Self-employed	12,296	5,860	47.7	2,929	23.8

* At least once a week.

12.2.4 Other estimates of telework

Italy has a question on work at home in its national Census, but not in the LFS. However, the Census data for Italy will not be available before the end of 2004. The most recent data for Italy (1999) are an estimate of 720,000 teleworkers or 3.6 percent of the total labour force by ECaTT and an estimate by the *Statistical Indictors Benchmarking the Information Society* (SIBIS) of five percent teleworkers, on average, in the Italian labour force compared with their estimate of 13 percent teleworkers in Europe (Empirica, 2000; http://www.sibis-eu.org. Each survey defined telework in different ways so that the data cannot be compared.

Although the 2000 NSI survey, 'culture, leisure and new technologies', did not determine how many Italians are strictly teleworkers, they found that a high percentage of workers are equipped to work remotely: 25 percent of Italians use a personal computer at home for work (28.4 percent male and 20.9 percent female) and 19.6 percent use the Internet at home for work (22.6 male and 15 percent female) (ISTAT, 2002).

12.2.5 Limits to national comparisons

The most recent telework counts shown in Table 12.1 were actually collected in survey years 2001 to 2004, meaning that they are not strictly comparable by that criterion alone. Also, the incidences for Ireland, the UK and US, are reported for non-farm workers. Hungarian counts include the 'Skilled agricultural and forestry workers,' who comprise 1.9 percent of all teleworkers.

A critical difference is that national Labour Force Surveys cover the location, frequency, and use of technology to work at a distance from one's employer with varying degrees of detail. All but one LFS avoids defining telework for the respondent. The Hungarian telework definition assumes the use of technology. In contrast, the surveys for Ireland, the Netherlands, the UK and the US first identify any work at home (or in some cases at various distant locations) and then determine any use of technology.

Another difficulty with the pre-defined approach is illustrated by the Hungarian definition of self-employment. Because certain populations are excluded, the Hungarian self-employed are undercounted relative to those reported by other national statistics.

Other factors also make the incidences reported in Tables 12.1 and 12.2 less reliable than ideal for national comparisons. They include variations in sampling (age ranges differ), type of interview (telephone, face-to-face, mail) and other methodological differences that are beyond the scope of this paper to describe.

12.3 Who are the 'real' teleworkers?

12.3.1 National definitions of telework

The Table 12.1 comparisons of the numbers of persons who work at home have been drawn from cross-tabulations of available LFS surveys. In fact, each country uses its data to construct definitions consistent with its own national policy issues:

- Hungary
  'Telework is an activity carried out not at the employer's premise, typically by using telecommunication connection (phone, PC, other)'. Survey questions imply that the home is the teleworking location.
- Ireland
  'Teleworkers refers to all persons who work from home and need a computer with a telecommunications link in order to do so'.
- Netherlands
  'Real teleworkers' among the homeworkers are those who need ICT hardware to work at home. 'The most important reason for teleworking is to finish (extra) work'.

- UK
  'A teleworker works at or from home using a computer and a phone and requires them'.
  'A telehomeworker = works at home using a computer and phone and requires them'.
  'An *e*Enabled homeworker = works at home using a computer and phone but does not require them'.
- USA
  In common usage a teleworker is a person who does any work at home.[1] The Bureau of Labor Statistics, which conducts the Current Population Survey (CPS) - the American equivalent of the LFS - adds a frequency minimum, defining teleworkers as persons who work at home 8 hours or more per week. Transportation planners use a more stringent definition: work at home during normal business hours as a substitute for commuting to work. Doing 'catch-up work,' i.e. finishing (extra) work, is not counted if the policy issue is to reduce travel to work and improve air quality.

12.3.2 Derived definitions of telework

Comparison of the national definitions of telework emphasises that there is no simple answer to the question 'how many teleworkers are there?'. It depends on why one wants to know. Table 12.1 illustrates the variation in counts of teleworkers that depend upon definitions of telework derived from survey data. For example, the Quarterly Household Survey of Ireland asks 'Do you work from home?' 'usually,' 'sometimes' or 'never' (see Table 11.5 in the last chapter and Table 12.4B) Transportation planners interested in work at home as a way to reduce commuting trips would limit the Irish total of 149,500 persons who *ever* do any of their work at home to define teleworkers as the 85,000 who *usually* work at home. In their analysis, planners would exclude the 65,000 casual individuals who *sometimes* work there because their work at home has less impact on traffic reduction.

Policymakers interested in the impact of ICT on employment would further restrict teleworkers to those individuals who use a computer and telecommunications link or more narrowly, to those for whom the ICT link is essential. That reduces the 59,900 Irish persons who have a link, to 39,200 who could not work at home without it. Clearly, if any of these or other definitions of teleworker had been used in the questionnaire, rather than at the point of analysis, it would preclude applying the data so widely.

12.4 Applications of telework data

12.4.1 Policy issues

Understandably, each nation has its own policy issues that account for the definition of telework that is chosen and explain its interest in, and use of the telework data. Because American transportation planners, as noted, are only interested in how many workers stay at home, they count workers whether or not technology is used; similarly, vendors wanting to sell to a home office market want to know the incidence of work at home by

1 For examples of various definitions of telework/telecommuting, see Pratt (1999).

persons with and without a computer, details regarding the type of telecommunications link, and use of any other equipment. EU countries are particularly concerned with equipping workers to participate in the global economy as the following examples illustrate.

The stated goal of the Netherlands is 'to play a pioneering role' in the process of helping the EU become 'the most competitive knowledge economy in the world.' As one aid to answering the questions 'who is using ICT, to what extent and for what purposes in the Dutch labour market?', the STILE-influenced telework module is used to 'look at the much-discussed phenomenon of teleworking. Who does it and to what extent is it actually happening?'. The Dutch are interested in the 'type of ICT hardware that is used to make teleworking possible' and 'people's motivation for engaging in telework'.

The Netherlands has also been concerned about a digital divide: 'The lack of opportunity to practice skills is normally found among women, younger people and ethnic minorities... participation in the Information Society is essentially a question of owning hardware. Once a person owns a computer, differences in skills are virtually negligible.' Such information is gleaned from survey data.

Similarly, in the US the political question, 'Is there a digital divide?' by gender, income, education or other factors, led to funding of a CPS[2] supplement series on computer use, and, as a later addition, the use of the Internet. Piggybacking the supplementary questions on work at home made it possible to monitor the relation between telework and technology.

12.4.2 Using Labour Force Surveys to assist policymakers and organisations

In addressing policy concerns, an outstanding difference among national approaches is the detail requested about use of technology to work from home. The UK survey, for example, asks only about working with a computer and telephone, reflecting the technological norms at the time the questions were originally devised, in 1996. The Irish similar but not identical question goes a step further in stressing that a computer with a telecommunications link is meant. The Netherlands survey probes uses of the Internet such as email and gathering information, which adds insights into the nature of tasks carried out at home. Online training is also identified. Both the Netherlands and the US inquire about the use of specific technology: a computer or laptop, email or Internet, fax, telephone, cellular phone or other ICT. Doing so adds information when making comparisons. If the use of computers and telecommunications becomes significant in a country, additional nested questions are warranted to discover the type of link. Currently in the US, researchers are noticing an increasing use of broadband connectivity by teleworkers (Pratt, 2003). Similarly, broadband has become a significant factor in the Netherlands. In 2003 broadband was accessed by 1.1 million Dutch people. That makes it less surprising that 34 percent of Dutch respondents answered 'yes' to sometimes working at home.

Finally, when the length of a survey permits, additional questions can be asked that give more insights into who is teleworking, the specific equipment and telecommunica-

2 The CPS is a monthly survey of households conducted by the US Census Bureau for the Bureau of Labor Statistics to collect demographic, social, and economic information about persons 16 years of age and older.

tions they use and their motivations for working at a distance. For example, the Netherlands survey asks 'Why do you work at home?' which reveals the crucial fact that for half of the participants, 'the most important reason for teleworking is to finish (extra) work'. This finding raises issues of pay for overtime work, which is specifically addressed with an additional question in the American CPS.

12.4.3 Cross-tabulations with LFS variables

Table 12.2 shows cross-tabulations by sex and employment status of worker (employee or self-employed). Other useful variables in the main body of a Labour Force Survey are occupation, sector, age, and educational level. In most surveys classifications within each of these items differ just enough to limit valid comparisons.

12.5 The STILE approach to measuring telework

12.5.1 Monitoring changes in the labour market in the New Economy

The goal of the STILE approach is to guide collecting 'reliable and comparable data' about telework in a cost-efficient way. The STILE recommended strategy of collecting data in objective terms allows defining teleworkers in different ways that correspond to a wide range of policy questions, which, as discussed above, might involve labour issues, transportation, diffusion of technology or others.[3]

12.5.2 STILE-like modules

Table 12.3 Column 1 lists the STILE module questions recommended for measuring telework. STILE-like questions asked in national surveys are indicated. Comparisons can be made according to the level of information collected if the questions are worded without ambiguity, as the STILE research found. When they are not, it is difficult or impossible. As the individual national LFS shown in Tables 12.4A-E illustrate, there are many ways to ask a series of objective questions about work patterns. Unfortunately, even minor variations in phrasing hinder comparisons.

For example, measuring the frequency of work at home is critical to judging the impact of telework in many dimensions ranging from the organisation of work to employee work-life issues. But surveys measure frequency differently. Hungary and the Netherlands ask for the time period 'last four weeks', whilst Ireland and the UK specify specific calendar days (Tables 12.4A-D). The US does not capture a time period but instead, asks for minimum frequencies, i.e. times/week followed by hours worked at home per week (Table 12.4E). Hungary and Ireland ask if work at home occurs usually/regularly or 'occasionally' whilst the Netherlands requests frequency in terms of number of times per month.

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3 For more detail on the research underlying the STILE recommended strategy, see Bertin, Bollen, Huws & Ramioul (2003), and the full reports on the project website, http://www.stile.be/ stile_publications.htm.

Table 12.1 showed that comparisons can be made, even with the variations in wording and sequencing of the questions. However, the errors incurred because of the differences, could be minimised if the STILE recommended questions were generally adopted.

A further advantage of using the modular format of open-ended questions is that additional questions and/or response choices can easily be added as new technologies or issues emerge, without losing the continuity needed to monitor trends. The Dutch survey, for example, asks detailed questions about technologies used and the very relevant question 'Why do you work at home?'.

Table 12.3 STILE-like questions in national LFS

	Ireland	Nether-lands	UK	US
1. Do you use a computer for your work?				
2. Do you use the Internet or email for your work?				
3. In the last four weeks, have you carried out work at any of the following places?				
- In your own home	✓	✓	✓	✓
- At locations belonging to a third party (as customer premises)				
- On the move (whilst travelling)				
- In more than one location belonging to customers or clients				
- Other places different from traditional workplaces (e.g. hotel rooms, conferences): specify_____				
- In more than one location belonging to your employer				
- At just one location of your employer (not a teleworker)				
- Other traditional workplaces: specify_____				
4. In the last four weeks, approximately how many hours a week, on average, did you spend working at a distance (from your employer's location)?				✓
5. Do you use a computer when working at a distance?	✓	✓	✓	✓
6. Do you use the Internet when working at a distance?		✓		✓

Table 12.4A Telework modules of national LFS: Hungary

Definition of telework: Telework is an activity carried out not at the employer's premise, typically by using telecommunication connection (phone, PC, other).

LFS 2001-2002	**Did you work in your main job/business in the last four weeks?** All squares must be filled out			
Q. 8	A/	in shift work?	yes: regularly (1); occasionally (2); no (3)	A
	B/	in an irregular (varying) working schedule?	yes: regularly (1); occasionally (2); no (3)	B
	C/	In the evening?	yes: regularly (1); occasionally (2); no (3)	C
	D/	at night?	yes: regularly (1); occasionally (2); no (3)	D
	E/	on Saturday?	yes: regularly (1); occasionally (2); no (3)	E
	F/	on Sunday?	yes: regularly (1); occasionally (2); no (3)	F
	G/	In telework?	yes: regularly (1); occasionally (2); no (3)	G
Q. 9	**Are you used to doing your main job/business at home?**		yes: regularly (1); occasionally (2); no (3)	
2003				
Q. 9	**A/**	**Are you used to doing your main job/business at home?**	yes: regularly (1); occasionally (2); no (3)	
	B/	**Did you do telework during the last four weeks (making use of instruments of informatics and telecommunication?)**	yes: regularly (1); occasionally (2); no (3)	

Table 12.4B Telework modules of national LFS: Ireland (2004)

(If respondent worked in reference week or had a job from which they were absent from a job)
Do you work from home?

1. Usually
2. Sometimes
3. Never

(If respondent usually or sometimes works from home)
(in your main job) Have you spent at least one FULL day in the seven days ending Sunday the XXth working

1. In own home?
2. In the same grounds or buildings as your home?
3. In different places using home as a base?
4. Not worked at home during reference week?

(If respondent usually or sometimes works from home)
Do you use a computer with a telecommunications link to carry out your work at home?
Note: The telecommunications link must be used to receive or convey data/information in the course of work. It is not sufficient for a link to be available on the computer but not used for work purposes.

(If uses a telephone with communications link for work at home)
Would it be possible for you to work at home (or use home as a base) without using a computer with a telecommunications link?

Table 12.4C Telework modules of national LFS: Netherlands

<V98B1A>	**How often in the last 4 weeks have you used a computer at home?**
<V98B2>	**Have you made use of the Internet during the last 4 weeks?**
<V98B3>	**Approximately how many hours per week during the last 4 weeks have you made use of the Internet?**
<V98B4A>	**How often during the last 4 weeks have you made use of the Internet at home?**
<V98B5>	**For which of the following work related activities have you used the Internet during the last 4 weeks?** MORE THAN ONE ANSWER IS POSSIBLE. 1. Email 2. Searching for information 3. Telephoning via the Internet/video conferencing 4. Looking for a job/applying for jobs 5. Training/course 6. Other work related activities 7. Don't know
<V98B6>	**In your current job do you ever work at home?**
<V98B7>	**On average, how often per month do you work at home? Is that one, two, three, or more than three times per months?** 1. One time per month 2. Two times per month 3. Three times per month 4. More than three times per month 5. Don't know
<V98B8>	**How many hours per week during the last 4 weeks have you on average worked at home?**
<V98B9A>	**Do you make use of a computer or laptop when you work at home?**
<V98B9B>	**Do you make use of email or Internet when you work at home?**
<V98B9C>	**Do you make use of a fax when you work at home?**
<V98B9D>	**Do you make use of a telephone, cellular phone or semaphone when you work at home?**
<V98B9E>	**Do you use other ICT to facilitate working at home?**
<V98B10>	**Why do you work at home?** INT.: MORE THAN ONE ANSWER POSSIBLE. 1. To finish up on (over)work 2. Business is home based 3. Because of commuting time 4. To better co-ordinate care tasks 5. Type of work 6. Initiative came from employer 7. Another reason 8. Don't know

Table 12.4D Telework modules of national LFS: UK (2003, 2004)

146. HOME	(If work in reference week) **(In your main job) do you work mainly...** 1. In your own home 2. In the same grounds or buildings as your home 3. In different places using home as a base 4. Or somewhere quite separate from home?
147. EVHM98	(if respondent works mainly away from home) **(Do you ever do any paid or unpaid work at home for your (main) job?**
148. HOMED	**(in your main job) have you spent at least one FULL day in the seven days ending Sunday the [DATE] working** 1. In own home 2. In the same grounds or buildings as your home 3. In different places using home as a base? 4. Not worked at home during reference week
149. TELEQA	(if respondent works at home or uses it as a work base) **Do you use both a telephone and a computer to carry out your work at home?**
150. TELEQB	(if uses a telephone and computer for work at home) **Would it be possible to work at home (or use home as a base) without using both a telephone and a computer?**
151. ATFROM	(if respondent works at home or uses it as a work base) **Do you work...** 1. for your family business 2. for an outside firm or organisation 3. or on your own account?

Table 12.4E Telework modules of national LFS: US (2004)

SMJ12	**As part of [this job/the work in (your/his/her) business/the work in the family business] (do/does) (you/name) do any of (your/his/her) work at home?**
SMU13	**Do you have a formal arrangement with your employer to be paid for the work that you do at home, or were you just taking work home from the job?**
SMJ16	**How frequently (do/does) you/name) work at home?** 1. At least once a week 2. At least once every two weeks 3. At least once a month 4. Less than once a month
SMJ17	**When you work at home, how many hours per week do you work at home for this job/business/family business?**
SMJ18	**How many days [a week/every two weeks] do you USUALLY work at home for this job/business/family business?**
SMJ19	**How many of these days do you work EXCLUSIVELY at home, that is, days when you don't travel to the office or other work site?**

Table 12.4E Telework modules of national LFS: US (2004). Continued

SMJ20	**(Do you/Does name) use any of the following equipment at home to do (your/his/her) work?** 1. Computer, including laptop 2. Email or Internet access 3. Fax 4. Telephone, cell phone or pager 5. Some other electronic or communication equipment O None of the above N No more

12.6 Conclusions and recommendations

Although surveys did not use STILE module questions, the fact that they used the STILE principle of asking objective questions made it possible in most cases to compare incidences of work at home. Some surveys also enabled comparisons of working in other distant locations, and/or the use of a computer and telecommunications link. To avoid misleading assessments when reporting numbers of teleworkers, it is essential to state the definition underlying the data, the actual questions asked, and sample surveyed.

Being able to compare the numbers of employed workers equipped to work from distant locations is valuable both internally for national policymakers and organisations and, importantly, internationally, for instance to monitor the development of new work pattern within the European Union. For enhanced accuracy in making the comparisons, the following principles are recommended:

- use the STILE set of core questions and phrasing;
- sequence the questions so that both use of technologies and/or work at a distance are captured;
- standardise labour force variables such as occupation, sector, and age ranges so as to enable cross-tabulating with distance work data;
- provide the same sets of cross-tabulations for each country making possible further comparisons of telework, for example, by occupation and sector categories, age, education, and urban/rural location;
- standardise additional questions on topics such as motivation to work at home, worker and employer attitudes, etc., which interest policymakers.

If the trend to work at home and other locations distant from the employer increases, many questions will arise concerning the benefits and negative outcomes for the organisation and the workers. They include, for example, questions of work organisation and conditions, labour market issues, mobility, and work-life balance that arise when work is brought into the home. In order to better understand the consequences of a more dispersed workforce, reliable and comparable data are needed. The STILE methodology is designed to help achieve that goal.

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13 Interplay of technological and organisational innovations: the case of eWork diffusion in the New Member States

Does eWork help to open new development paths? Lessons from various EU projects

CSABA MAKÓ / MIKLÓS ILLÉSSY

Abstract

This chapter focuses on some dimensions of the distribution of eWork in selected New Member States (NMS) and in the EU-15 countries. The introduction outlines various cycles of the transformation process in the Central and East European (CEE) region, and locates the eEconomy in this process. Our approach is to provide an analysis of the distribution of eWork and to present the aspects of demand and supply from a labour process perspectives. The authors interpret eWork not as a new tool of working facilitated or enabled by ICT, but as an organisational innovation. Due to this interpretation, the recommendations formulated for both policymakers and researchers call attention not only to the complexity of changes required by the successful implementation of eWork, but also to the often neglected social-organisational and cultural contexts of these changes. In this perspective, the importance of different production paradigms and their national variations should be stressed. For example, more flexibility in manpower and skill use related to post-Fordist forms of work organisation - supposing the existence of an adequate ICT level at the firms - may speed up the distribution of various forms of eWork. At the same time, the dominance of the Fordist type of work organisation may slow down the speed of implementing eWork even in firms that are equipped with an excellent quality of ICT equipment. In stressing the organisational innovation character of eWork, we have to mention that more efforts should be made - among both practitioners and researchers - to better understand and overcome the socio-cultural and economic barriers (e.g. industrial-age management culture) to the flexible use of manpower and knowledge. In this relation, we have to call attention to the significant role of networking in 'project-type work' and the related patterns of knowledge conversion that have taken place in the labour process.

13.1 Introduction: the various cycles of the transformation process

13.1.1 Cycles of 'destruction' and 're-construction' in the post-socialist economies

In the social sciences, the early 1990s were a period of studying the so-called 'transformation economies', which visibly enriched the literature with numerous volumes on the political, economic and social changes that took place in Central and Eastern Europe

(CEE).[1] In this decade, the theoretical concept of 'path-dependency' helped social scientists to refute the 'institutional vacuum' view which overlooked the importance of the varied social-economic and cultural history of these countries. The 'path-dependency' approach provides a better understanding of the variety of development trajectories in the post-socialist economies in the Central European region and calls attention to the evolutionary character of socio-economic and technological development.[2] The explanatory strength of this approach was helpful in understanding the 'destruction' of the state-socialist political and economic regime, and the 'reconstruction' of the market economy and the democratic political institutions in the post-socialist economies. Using this view, we could understand - among other things - the uneven development of post-socialist firms and management. In this relation, we have to note that privatisation, market competition and foreign direct investments (FDI) based investment policies were the main drivers of economic development and modernisation in the CEE countries, but 'social filters' (labour relations systems, educational and training institutions, regional development agencies, etc.) also played a significant role, since it was through them that the various social actors (owners, managers, the state, workers and their interest representative associations, etc.) experienced and 'digested' the changes. Differences in the 'absorptive capacities' related to these changes may explain the differing speeds and paths of the transformation process in the countries of Central and Eastern Europe. For example, at the end of the 1990s, especially from 2001 onwards, incoming FDI started to decline in Hungary, as was also the case in Poland and the Czech Republic, whereas the foreign capital export from these countries began to increase, especially from Hungary (see Appendix 1). In addition, the composition of FDI changed dramatically: in the share of FDI, manufacturing investment was increasingly replaced by services and trades. Experts dealing with the FDI-based development model have recently warned that 'the reserves of once-successful attractive factors were exhausted. Investors' interest turned to other investment targets. Under the conditions that pertained, the capital absorption capacity of the country may also have become saturated. The decline on both the demand and the supply side is interpreted here as an end of a period of capital attraction. To revive the capital inflows will require the establishment and strengthening of new attraction features.' (Szanyi, 2003).

13.1.2 The 'creative' cycle of the transformation process

In the first cycle of the transformation process - which lasted until the second half of the 1990s -, the key motives of FDI were 'market seeking' and 'efficiency seeking', while in the new cycle 'knowledge seeking' is the main motive and the key driver of the FDI-based

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1 By using the term 'transformation' instead of 'transition', we intend to refute the thesis of 'instant capitalism' in the post-socialist economies of the Central European region, because this view underestimates the importance of time for social learning processes in creating market economy institutions in these countries.

2 'Path-dependent emergence of a new, post-socialist form of capitalism calls for a complex evolutionary interpretation of this great transformation, as opposed to the 'big bang' view which, as the metaphor itself suggests, forgot something historical was there before' (Chavance, 1995).

economic growth in the post-socialist New Member States (NMS) (Makó, 2003).[3] In the 'creative cycle' of the transformation process, the position of the CEE countries in the global economy (and first of all in the EU market) can only be maintained and/or improved if they take part in the exchange of goods with products/services containing higher added value. In other words, they have to attract strategic functions and services of the multinational corporations (MNCs) instead of low value-added operations which still dominate the manufacturing and service landscape of these economies.[4]

In the new period of the transformation process the main drivers are - among others - the intensified global competition and the increased profit expectation derived from the dominance of the financial markets. These pressures force economic actors to implement cost-cutting management practices and other forms of organisational innovations (e.g. new working practices like telework, etc.) in the economy in general, and in the SME sector in particular.[5] These are achieved by - among other things - the use of ICT in the process of delocalisation of various business services. ICT is opening up or facilitating radical changes in management methods and work organisation, especially in the service sector. However, the impacts of ICT-based changes on work organisation do not diffuse equally either in the economy or in society.[6] In this relation, we may detect a visible gap

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3 The notions of New Member States (NMS) and Central and Eastern European countries are overlapping and cover different subgroups of countries: NMS comprise the Baltic republics of Estonia, Lithuania, Latvia; the Mediterranean countries of Malta and Cyprus; and the Central European (CE) countries of the Czech Republic, Hungary, Poland, Slovakia and Slovenia. These countries joined the EU in May 2004 (Bulgaria and Romania are expected to join in 2007, while Turkey's accession is under analysis and political assessment). In our analysis we are focusing on the CEE region, and most notably, on the Czech, Hungarian and Polish economies, which have been most thoroughly researched and analysed by international comparative projects as well as being the largest of the NMS.

4 The position of Central European countries in the 'knowledge-based economy' is surprisingly good. For example, according to the OECD 2001 report, the role of the ICT sector is extremely significant in Hungary: '... in Ireland (35 percent of the manufacturing trade), Korea (32 percent) and in the Netherlands, Japan, Hungary and Mexico, where it represented one quarter of the total manufacturing trade in 1999' and '... international scientific co-operation in science and technology is also relatively high in Hungary, Poland and the Czech Republic' (OECD, 2001).

5 During the first cycle of the transformation process, the SME sector was an extremely important employment generator in the CEE region and especially in Hungary. The SMEs employed the great majority of laid-off or dismissed personnel of the restructured/privatised state-owned enterprises and public sector. To maintain this important employment stabilisation function of the sector, it will be of crucial importance for SMEs to improve their position in the globalised economy using the opportunities opened up by the extensive use of ICT.

6 According to the results of a recent survey comparing the development of the information economy and society among New Members' States, it is necessary to mention that in the case of the information economy (measured by the share in output, employment and export of the sectors producing ICT equipments and services) Hungary belongs with the most developed countries, together with Malta and Estonia. However, in the case of indicators of information society (e.g. number of PCs per households, Internet access at home, etc.) Hungary belongs among the less developed countries (cf. Gáspár, 2004). However, even in the case of information society, households have heterogeneous positions. For example, the preliminary results of the 'Regional-IST' project (2001-2004), comparing the distribution of ICT equipment by region (Baden-Württemberg, Catalonia, Portugal, Piedmont and Hungary) indicates the following patterns: only 34 percent of Hungarian households compared with 61 percent of

in the use of *e*Work between large firms and the smaller ones (SMEs). The empirical experiences call attention to - in addition to well-known factors such as the price of ICT equipment or income structures of the population, lack of content development, etc. - the often undervalued influence of the organisational and cultural factors which limit the distribution and use of *e*Work in the economy. Adopting this approach, this chapter interprets *e*Work as a form of organisational innovation and stresses the importance of a labour process analysis. Stressing the key role of organisational and cultural factors in the diffusion of *e*Work, we intend to focus on the SME sector. This does not mean that implementation of *e*Work in large firms is not shaped by these factors, but the role of organisational innovations and the related organisational learning processes in large firms are widely investigated and known for decades in the management literature.[7] By contrast with this extensive knowledge of *e*Work diffusion in large firms, we have often only fragmented, case study based (anecdotal) experiences on the SME sector.

Organisational innovations have crucial importance for firms' capability to solve significant organisational problems more efficiently. There is no consensus in the academic community on the interaction between organisational and technological innovations. However, we share those views according to which ICTs are not external factors, but develop within the social and organisational practices of the firms (institutions). In spite of the abundant empirical works on organisational innovation, consensus on the classification of organisational innovations is still lacking. Among the attempts to develop a typology of organisational innovations based on the depth of organisational change, we found Schienstock's classification (2004) the most suitable for our analyses. Instead of distinguishing between isolated or piecemeal versus integrated (holistic) forms of organisational innovations (Alasoini, 2003), he suggests making a distinction between various types of organisational innovations according to the changes in the core components of organisation and according to the relationships between these core elements (we will describe the content of this classification in detail when interpreting telework diffusion, in Section 13.3).

The present chapter is structured around two main issues. The first one deals with the *delocalisation* of business services from the demand side perspective of employers, while the second one addresses the preconditions of the successful implementation of telework. In identifying the degree of involvement of some of the NMS (Czech Republic, Hungary and Poland) in the process of delocalisation, we may construct a 'proximity indicator' which expresses the position of these economies in the new (creative) cycle of their economic development. The countries' attractiveness in practising business service functions indicates the followings: the three CE economies occupy a leading position in high value-added business service exemplified by software development and support. However, this favourable ranking among the top ten destinations is fragile. Fragility here refers on the one hand to the asymmetric positions of medium and large sized firms in compari-

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households in Baden-Württemberg have a PC and home Internet use is 14 percent versus 47 percent of households. The share of regular Internet users in Hungary is 20 percent compared to 30 percent in the other three regions. However, there are no differences in the share of *e*Shopping among the Internet users in the five regions surveyed. Similarly, the level of mobile phone penetration is extremely high (65.7 percent to 83.2 percent) in the regions investigated. (cf. Regional-IST project - IST-2001-33199).

7 For some examples, see Brown & Duguid, 1991; Koike & Inoki, 1990.

son with the micro- and small companies and on the other to significant sectoral discrepancies (e.g. the relatively weaker position of the manufacturing sector than that of the business and financial services).

To better understand the various characteristics of business service delocalisation, the next section presents a typology of work delocalisation, identifies the position of three CE countries in the process of work delocalisation, assesses the reasons for choice of locations and indicates the role of size in the use of ICT-related services.

13.2 Work delocalisation: the attractiveness of the CE region (demand side perspective)

13.2.1 The typology of work delocalisation: the case of generic business functions

In the EMERGENCE project (see Appendix 3), work delocalisation (*e*Work)[8] is broadly defined as 'any information work that is carried out away from an establishment and managed from that establishment using information technology and a telecommunications link for receipt or delivery of the work'. In classifying work delocalisation, the following two distinctions were made, firstly the *legal distinction* between work carried out within the organisation (i.e. by employees, usually covered by employment contract) and outsourced work, normally carried out under a service supply contract. The second dimension of *e*Work made a distinction between work carried out by a group or collective of workers on shared 'office' premises and work carried out individually and away from 'office' premises. Table 13.1 illustrates the typology of *e*Work or work delocalisation using ICT.

Table 13.1 Typology of work delocalisation

Type of workplace	Contractual or legal	
	Internal employees	Outsourced
Individualised (away from 'office' premises)	Employed telehomeworkers Mobile employees	Freelance *e*Workers or mobile workers (='*e*Lancers')
Collective (on shared 'office' premises)	Remote back-offices/call centres Employees working in tele-cottages or other third party premises	Specialist business service supply companies Outsourced call centres (=*e*Service suppliers)

Source: Huws & O'Regan, 2001: 15

The employers' survey - which covered 7268 employers in 18 European countries, the 15 EU Member States plus the Czech Republic, Hungary and Poland - and 62 company case

8 Work delocalisation is of course a broader term than *e*Work, but in what follows we shall use the former term in a narrower sense covering only the ICT-facilitated work delocalisation.

studies carried out in 54 NUTS1 EU regions[9] examined *e*Work through the delocalisation of the following seven generic business functions:
- customer service, including information supply, counselling and advice;
- sales (telemarketing and mobile sales);
- data processing, typing and other forms of data input;
- software development, maintenance and support;
- accounting, debt collection and other financial services;
- human resource management and training;
- design, editorial and other forms of creative or content-generating work including research and development.

13.2.2 Demand for *e*Work in Europe: the relatively good position of the CE countries

Using the broad definition of work delocalisation presented in the previous section (Huws & O'Regan, 2001), we can say that almost every second (49 percent) employer interviewed in the 18-country employers' survey is already practising some form of *e*Work. Comparing national variations in the distribution of *e*Work, several distinctive types were identified, for instance Sweden, Finland and the Netherlands - the advanced high-tech economies - had high levels of *e*Work by employees, whilst Central and Southern Europe had high levels of '*e*Outsourcing'. These latter countries are highly attractive for work delocalisation, which involves strong demand for micro- and small firms. The availability of ICT in these countries has enabled these firms to combine the traditional forms of subcontracting with *e*Subcontracting. However, the diffusion of *e*Work is higher in large firms than in small ones.

On comparing the locations involved in remote work, employers (i.e. the demand side) mentioned the following ten top 'destinations' for *e*Work relocation (see Table 13.2).

Comparing the two columns in Table 13.2, we can say that the Czech Republic and Poland in both absolute and relative terms and Hungary in absolute terms are among the top ten most favoured destinations for *e*Work for companies across the EU.

From among the seven generic business functions identified by the EMERGENCE project it is possible to single out the most attractive destinations for software development and support. The following three categories of countries should be distinguished: (1) the three NMS: Poland, the Czech Republic and Hungary; (2) the capital regions or highly developed urban zones with strong business sectors, like Brussels, London, Lombardy, Northern-Westphalia, and the Madrid Region; and (3) the so-called 'secondary regions', which are also developed and represent attractive top locations for software development and maintenance (e.g. Emilia-Romagna in Italy, North-East Spain, Southern Spain and the Bremen region in Germany).

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9 With regard to this, we have to call attention to the problem of the EU NUTS1 level regions, which were the basis for classifying locations. NUTS1 regions are large and in the case of the smaller countries (e.g. Denmark, Ireland, Luxemburg, Portugal) they constitute a whole country. In the case of the candidate countries, due to problems of the data compatibility, locations were coded at the national level only, despite the relatively large size of Poland.
The case studies' sample is structured as follows: 27 trans-regional and 24 cross-border relocations (eight of which were transcontinental cases), in addition, the sample includes three 'mixed cases' (i.e. involving both cross-border and trans-regional relocation).

Table 13.2 Top ten 'destinations'* for *e*Work (absolute and per capita)

Absolute	Per capita
Poland	Region Bruxelles (Belgium)
Czech Republic	Bremen (Germany)
London (UK)	Noord-Nederland (The Netherlands)
Baden-Württemberg (Germany)	Czech Republic
Nordrhein-Westfalen (Germany)	Poland
Noreste (Spain)	Hamburg (Germany)
Comunidad de Madrid (Spain)	London (UK)
Lombardia (Italy)	Berlin (Germany)
Hungary	Luxemburg
Bayern (Germany)	Sur (Spain)

* In the EMERGENCE 18-country employers' survey, we made distinction between source and destination countries. By source country we meant a country from which a business function was relocated into another region, country or continent. The destination country indicates the country to which the above mentioned business functions were relocated (these are sometimes referred to as 'host-countries').

Source: Huws & O'Regan, 2001: 52

Table 13.3 displays the top ten locations for 'software development and maintenance'.

Table 13.3 Top ten destinations for software development and support (in absolute terms)

Poland
Czech Republic
Noreste (Spain)
Nordrhein-Westfalia (Germany)
London (UKI)
Comunidad de Madrid (Spain)
Lombardia (Italy)
Hungary
United States
Nord Est (Italy)

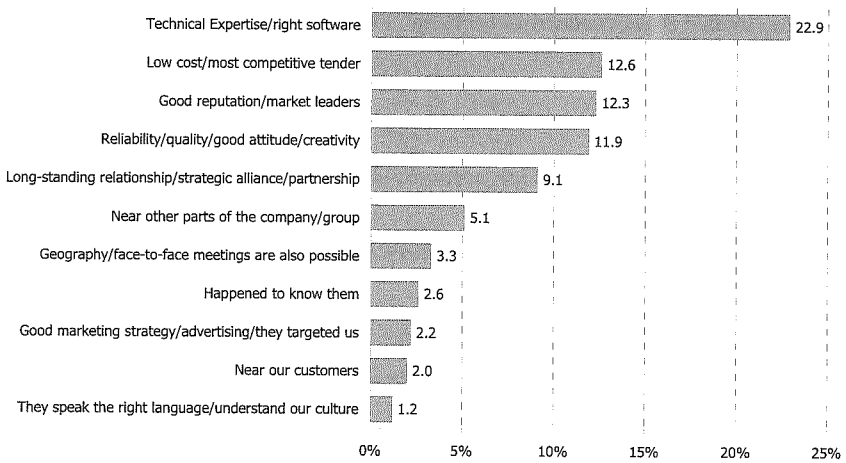
Source: EMERGENCE European Employer Survey, 2000 (IES/NOP). Weighted figures, establishments with >50 employees in EU-15 plus three Candidate Countries. Huws & O'Regan, 2001: 62

In relation to the reasons for choice of location, contrary to the widely held stereotyped views, 'low cost or most competitive tender' comes only second after 'technical expertise'[10] followed by 'good reputation/market leaders', while 'reliability/quality/good

10 In relation to the examination of reasons for the choice of destination of work relocation, it is worth noting that according to the representative of Association of IT Entrepreneurs, Hungarian software or IT experts are not more expensive compared to the Indians. One hour wage cost in Hungary is 25 US dollars which is identical to the Indian cost. In comparison, the hour wage rate in the US 100-150 US dollars (Kováts, 2004: 11-5.)

attitude/creativity' ranks fourth on the list.[11] The next position was occupied by 'long-standing relationship/strategic alliance/partnership', which draws attention to the 'evolutionary' rather than 'revolutionary' character of business service relocation.

This picture sketched above regarding the various characteristics of the distribution of *e*Work concerns medium-sized and large business organisations. Unfortunately, due to the substantial budget cut of the original project proposal, the EMERGENCE project could not cover the important segment of micro- and small firms from a demand-side perspective, in spite of the fact that without exception these firms dominate the organisational morphology of the national economies surveyed in this project.[12] However, the size of the firm matters more in the NMS than in the EU-15 countries. These differences represent a source of asymmetrical participation of business organisations of various size categories in the emerging *e*Economy. The next section briefly outlines the position of the SME sector in the use of *e*Work.



Source: EMERGENCE European Employer Survey, 2000 (IES/NOP). Weighted figures; base = 4,154. Respondents who obtained *e*Services from another region were asked why they chose that region or supplier and were able to select several reasons for each instance of relocation. Percentages are based on the total number of reasons. Huws, 2003: 53

Figure 13.1 Reasons for choice of outsourcer for *e*Services - the demand-side perspective

11 In this context a comparison can be made with the results of a study of outsourcing of call centres activities from Scotland to India. Here, the most important motives mentioned was 'reduced costs/increased profitability' and 'availability of educated staff/labour pool/skills' was only given secondary importance. The third most important reasons cited were the 'repetitive work/routine operations/outbound, cold calling'. See in detail Taylor & Bain (2003: 55).

12 The share of micro and small firms in the ICT sector is 95 percent in the CEE countries. In the case of Hungary, firms employing more than 20 persons represent less than 2 percent of all enterprises. In addition, it is necessary to mention that, in the ICT sector, 250-300 firms operate currently in the software industry sub-sector. Evaluating the growth potential of the ICT market in the CEE countries, the rate of ICT market growth is several times higher than in the EU-15 countries.

13.2.3 Size matters more in the New Member Countries than in the EU-15

On the basis of the analysis of bivariate relationships between *e*Work and the characteristics of the firms, such as the number of employees (Makó & Keszi, 2003), we can say that this type of work is more likely to be used in large firms than in the small ones, and is more likely to be practised in the business and financial service sector than in the public one.

Table 13.4 shows the distribution of *e*Work by company size, and the following interesting contrast was found between the EU-15 and the three NMS: the distribution of *e*Work within the EU-15 countries is rather balanced between the firms employing 50-200 persons (41.7 percent) and those employing more than 200 persons (44.4 percent). At the same time, in the three NMS, larger companies have greater *e*Work distribution (71.9 percent) in comparison to the smaller ones (64.5 percent). On the whole, the dominant pattern is that the larger the size of the firm, the greater the practice of *e*Work, but we can find significant differences among the former socialist economies. Following this concise overview of the distribution of *e*Work in the NMS, the next section examines the distribution of telework within small and medium-size firms in five, so-called 'strong' regions in Europe.

Table 13.4 Distribution of *e*Work by size of the firm, percentage

Size of firm	Region/country	Use of *e*Work		
		No	Yes	Total
50-200 employees	EU-15	58.3	41.7	100.0
	3 New Member States	35.8	64.5	100.0
	Czech Republic	26.3	73.7	100.0
	Hungary	45.2	54.8	100.0
	Poland	35.7	64.3	100.0
	Total	54.2	45.8	100.0
More than 200 employees	EU-15	55.6	44.4	100.0
	3 New Member States	28.1	71.9	100.0
	Czech Republic	17.8	82.2	100.0
	Hungary	24.3	75.7	100.0
	Poland	32.1	67.9	100.0
	Total	50.4	49.6	100.0

Source: EMERGENCE European Employer Survey, 2000 (EIS/NOP), percentage of establishments with >50 employees in EU-15 plus Czech Republic, Hungary and Poland. Weighted base: 7,305. Makó & Keszi, 2003: 16

13.3 An attempt to interpret telework as a form of organisational innovation. The SME sector in a comparative perspective

The eGap research project aimed at understanding the implementation practices of telework in five 'strong' regions in Europe, namely: Tampere region (Finland), Rhônes-Alpes

region (France), Central Transdanubian region (Hungary), Emilia Romagna (Italy) and Greater West London Wedge (United Kingdom) (see Appendix 2). The international eGap team combined three types of research tools, involving both quantitative (e.g. survey method) and qualitative techniques (e.g. interviews) as well as desktop research. The issues examined in the project were based on the following themes:

- preparation for implementation of telework;
- operational practices;
- enablers and inhibitors related to the introduction of telework;
- the social context of telework;
- output and impacts of telework.

From among the issues outlined, we intend to stress that the quality of the ICT used in the SME sector is important, but it does not directly influence the implementation practices of telework (see Appendix 2). Besides the quality of ICT infrastructure, the eGap project also aimed to identify and assess the roles of various social-organisational factors which influence the implementation of telework in the SME sector. In operationalising the socio-organisational dimensions of telework, we used such indicators as participation in project-type work, patterns of supervision, responsibility of employees in work, and the production paradigm, which was constructed by combining the last two indicators.

The participation of SMEs in network-type co-operation may facilitate the implementation of telework. However, the intensity of the networking of the firm *per se* or the number of individual ties established by the firms surveyed represent only an early cycle of networking. Contrary to generally held views, strong ties reflected in the extent of project-type co-operation, instead of weak ties, create favourable preconditions for the diffusion of telework in general and especially in the SME sector. It is interesting to note, for example, that the Hungarian firms surveyed in the eGap project had the most intensive individual participation in networking activities - two thirds of them co-operated with more than ten companies - while project-type work organisation was almost non-existent among them. Contrary to Hungarian experiences, in the Finnish and British regions, where weak-ties-based networking was prevalent to a lesser extent, project-type work was deeply integrated into the everyday working experiences of the SMEs.

In analysing empirical data collected from the survey of more than 1,700 small and medium-size firms in the five regions investigated, we classified them according to the pattern of supervision (direct versus indirect) and to the autonomy of employees in work. Direct or closed supervision characterised the Italian (73 percent), Hungarian (72 percent) and the French (53 percent) SMEs, while in the Finnish and British firms indirect managerial control was practised in the form of 'teamwork'. Similarly, greater autonomy in work was identified in the firms operating in the Tampere and Greater West London Wedge regions then in the other three regions (Emilia Romagna, Central Transdanubia and Rhône-Alpes) where employees had rather limited autonomy in their work. Combining

the dimensions of 'supervision' and 'responsibility in work', we may construct the following types of production paradigm (models of work organisations)[13] (see Table 13.5).

Table 13.5 Production paradigm used in the analysis of the distribution of telework

Type of supervision	Responsibility in work	
	Limited	Extended
Direct/closed	Fordist model	Transitional or neo-Fordist
Indirect (via teamwork)	Transitional or neo-Fordist	Flexible or post-Fordist

Source: Makó, Melles & Keszi, 2004

Using the categories of production paradigms, we can say that the highest rate of telework is typically found in regions where the SMEs made use of the post-Fordist (flexible) or neo-Fordist (transitional) production paradigm. A low distribution rate of telework was found in the firms using Fordist type working arrangements. Comparing the five regions surveyed, we can say that the Fordist and neo-Fordist type work organisation is dominant in the SMEs operating in the Emilia Romagna (90 percent) and the Central Transdanubian (89 percent) regions. Post-Fordist work organisation used by SMEs is most frequent in the Tampere region (43 percent), followed by firms operating in the Greater West London Wedge region (35 percent). The SMEs in the Rhône-Alpes region have an intermediary position between the two groups of regions mentioned earlier. Table 13.6 identifies the distribution of production paradigms in SMEs by the five regions investigated in the eGap project.

Concerning the relation between the share of telework and the dominant production paradigm, we may stress the following: the highest rate of telework in SMEs was found in the regions where 'neo-Fordist' or 'post-Fordist' work organisation was dominant, i.e. in the regions of Tampere and the Greater West London Wedge. The lowest rates of telework were identified in such regions as Central Transdanubia and Emilia Romagna where in the labour process Fordist-type work organisation is dominant and the share of Post-Fordist work organisation is residual.

In our interpretation, telework is not only a new individual form of work based on the use of ICT, but it also represents an organisational innovation.

13 In developing production paradigms, beside the well-known concept of 'Fordism', we made a distinction between neo- and post-Fordist patterns of work organisation. In the first case, changes in the work do not modify radically the content of work and the degree of autonomy remains limited. In the second case, the work is characterised by high involvement of employees in the design, organisation and supervision of work (see in detail Makó (2005)).

Table 13.6 Production paradigms in the eGap regions surveyed, percentage

Regions	Share of firms using the following production paradigm		
	Fordist	Neo-Fordist (transitional)	Post-Fordist ('flexible')
Emilia Romagna (telework: 17.6%)[1]	65	25	10
Central Transdanubia (telework: 15.9%)[2]	65	24	11
Greater West London Wedge (telework: 45.9%)	34	31	35
Rhône-Alpes (telework: 68.7%)	43	28	29
Tampere (telework: 52.1%)	23	34	43

[1] The share of telework indicates the opportunity to telework, which was measured by the simultaneous presence of distance work and ICT use in this work. The indicators are based on the calculation of Roland Keszi, used in his Ph.D. Dissertation on Telework. (October 2004). The average rate of telework concerning the five regions participating in the eGap project was 39.7%. (eGap, EU 5th Framework [2002–2004] – EU-IST-2001-35179)

[2] In this regard, it is worth noting that the latest European Working Conditions Survey (2001) supported our results that employees in the New Member States have considerably less control over work and organisation of tasks or over working time than in the EU-15 countries. On the other hand, support from colleagues is more readily available in the new member countries than their EU-15 counterparts.(European Foundation for the Improvement of Living and Working Conditions, 2003: 4).

Source: Makó, Melles & Keszi, 2004: 34

It is worth mentioning here that the differences in Internet use among the SMEs investigated in the eGap project were visibly smaller than the differences in their employed production paradigms.[14] When evaluating telework as an organisational innovation, we have to give a brief typology which reflects the extent or the depth of the organisational changes.[15] From among the various classification attempts of organisational innovations, in this chapter we adopt the typology elaborated by Schienstock (2004: 17-18). This multidimensional classification overcomes the rather simplistic distinctions of isolated (piecemeal) versus integrated (holistic) forms of organisational innovations. His approach

[14] In every ten firms, at least seven or nine firms are using the Internet and we found the same pattern concerning *e*Communication (email). By contrast, in the case of production paradigms, at one extreme of the scale firms from Tampere and Greater London Wedge regions could be found, where more than three or four out of ten firms applied flexible (post-Fordist) production paradigms. Emilia-Romagna and Central Transdanubia represented the other extreme of the scale, where only one in ten SMEs relied on the post-Fordist type of production paradigm. See in detail, Makó, Keszi, Melles & Tamási (2004: 9).

[15] Among the recent analyses on organisational innovations, the following mainstream approaches were distinguished: (1) organisational design approaches focusing on the relations between structural characteristics and capacity of organisation to innovate; (2) streams of organisational learning focusing on the process of both individual and organisational knowledge creation; (3) approaches emphasising the process of change/adaptation reflecting in the new organisational form (cf. Lam, 2004). Adapting the third school of organisational innovation, we intend to examine the typology of organisational innovation based on the depth of organisational changes elaborated by Schienstock (2004).

distinguishes not only changes affecting core elements of an organisation (e.g. power distribution) and changes affecting their interrelationships (e.g. organisational profile), but also their interactions. The various types of organisational innovation are summarised in Table 13.7.

Table 13.7 Various types of organisational innovations

Interrelationships between core components	Core components	
	Unchanged	Changed
Unchanged	Incremental innovation (e.g. job rotation, job enlargement)	Modular innovation (e.g. transfunctional design team, self-organising working groups)
Changed	Architectural innovation (e.g. flat hierarchies, profit centres)	Radical innovation (e.g. virtual organisation)

Source: Schienstock, 2004: 18

'Incremental' organisational innovations do not modify either the core elements or their relationships; these types of changes are illustrated by the individual job level changes, such as job rotation, job enlargement and job enrichment. These changes do not extend the individual boundaries of the job. The 'modular' version of innovation modifies the existing core arrangement of an organisation without changing the patterns of relationships between the core elements. For instance, in the case of transfunctional design or planning teams, members are recruited from different units of the firm and a new core element is created within the organisation without changing the power patterns within the firm. In the case of the 'architectural' organisational innovation - flat organisation -, knowledge management and organisation of working activities within the firm are organised in a new, decentralised way. Finally, 'radical' innovation indicates visible changes both in the core elements and in their relationships within the firm. Virtual organisations or 'project-based firms' (PBF) (Whitley, 2004) represent this type of organisational innovation.

A good example of this was illustrated by the so-called 'Internet-based broker firm' case study in the EMERGENCE project. This type of project-based firm connects small firms and individual freelancers with expertise and motivation to supply the work needed for the successful realisation of the project. These Internet-based broker firms accomplish the outsourced project by consolidating a large number of suppliers into one database and then - by using the efficiency of the Internet - they 'broker' (intermediate) the suppliers' services to clients for a small commission. In doing so, they have created a virtual marketplace for buying and selling digital work. The originality of this emerging organisational solution enabled by ICT is that it opens up the outsourcing perspective - which is limited in the 'old economy' to clusters of medium and large firms - for groups of micro- and small firms. Some of these intermediaries belonging to the category of micro- and small firms have already achieved sufficient scale to become important players in the development and expansion of *e*Work globally (Makó & Keszi, 2003: 35-8). This improved position of micro- and small firms, firms which combine ICT use with such radical organisational

innovations as 'Internet-based brokering', offers them a better chance to compete in the global market of *e*Work and to overcome the aforementioned size barrier (see Subsection 13.2.3).

In our interpretation, telework may belong to both 'incremental' and 'modular' innovation. In the first case, neither the core elements nor the interrelationships between them change, in other words the content of jobs remains the same and only the location is modified by using ICT. In the second case, the relationships between the core elements of the organisation do not shift fundamentally (e.g. power relations or patterns of employment between owners/managers and employees remain the same), but within the core elements, significant changes are taking place. For example, the successful implementation of telework - as we noted earlier concerning the relation between the production paradigm and the diffusion of telework - requires significant modifications both in the form of supervision (e.g. replacing direct supervision over subordinates by indirect or output-centred forms of control) and in the structure of tasks and communication in the labour process. These changes presuppose not only individual but also organisational learning, underlying the importance of the shift in working culture necessary for the successful implementation of telework. Stressing the importance of the organisational learning process, it is worth mentioning the necessary extra time needed to modify the working culture of the industrial age production paradigm and to reshape the traditional patterns of social relations of teleworkers outside the sphere of work, too (e.g. changes in the patterns of family and also in local community participation).

13.4 Concluding remarks: challenges for policymakers and researchers

The new path of development in the economies of the CE region represents a shift from FDI driven modernisation of manufacturing to growth generated by higher value added products and services. The new cycle of the transformation process should be based not only on the deeper integration into the international division of labour, but also on the supply of higher value-added products and services. In this regard, it is worth mentioning the findings from the EMERGENCE project (2000-2003) on the relatively favourable position of the three NMS - Poland, Czech Republic and Hungary - in the process of delocalisation of generic business services (e.g. software development and maintenance, creative activities).

The attractiveness of these economies is limited mainly to the sector of medium and large firms in spite of the fact that the overwhelming majority of firms belong to the category of micro- and small firms, which have a rather weak position in the emerging knowledge economy in the CE region. As we have noted earlier, the 'size category' matters more in the economies of the NMS than in the EU-15. Similarly, innovative activities in the micro-, small and even in the medium-sized firms are significantly less important than in large firms. In this respect, we have to draw attention to the generally 'innovation-unfriendly economic environment' in the NMS, where central and local governments rarely support the creation of science parks with lands and infrastructure, where the innovation supporting risk capital activity is almost absent, and where, in addition, the share of R&D in GDP is significantly lower than in the EU-15 countries. For example, the share of R&D in GDP in Hungary was only 0.92 percent in 2003, while Hungary's GDP per capita was only 50 percent of the EU-15 average. In addition, even before EU member-

ship, R&D activities were charged with 25 percent VAT. To get a real picture of the size of the recent government initiative (2004) to support the creation of 'regional university knowledge centres', the total annual budget of this government initiative is 1.5 billion HUF, while the Richter Gedeon pharmaceutical firm spends 7.5 billion HUF per year for research and development activities.

To overcome the asymmetric position existing between large and small firms' participation in the *e*Economy of the CEE region, important policy re-orientation is needed. Here, besides the traditional individual firm-centred support policy, we also have to mention the network-generating support schemes. Unfortunately, in the post-socialist economies of the CEE region, network development initiatives or even 'network-awareness' among the social and economic actors are underdeveloped.[16] In addition, it would be necessary to create not only 'best practices' or a list of 'benchmarking' cases to help the diffusion of networking of SMEs, but also to support the development of the national lead sectors or products, which would speed up the collective learning process of various social and economic actors (e.g. Nokia's benchmarking role in Finland).

Experiences identifying both the facilitators and the inhibitors of such new forms of work as 'telework' indicate the following: the social and economic actors involved in the diffusion of telework or other kind of new working practice (e.g. Internet-based broker firms) often underestimate the need to change the existing organisational culture. In other words, representatives of the government and owners/managers in the SME sector do not take account of the organisational learning process necessary for the successful implementation of telework. International projects like the 18-country EMERGENCE project on the relocation of generic business functions and eGap project carried out in 'five strong regions' of Europe drew attention to the importance of production paradigms and the increasing role of 'project-based firms' (PBF) (Whitley, 2004) in facilitating or inhibiting the implementation of new forms of work. According to these results, the presence of the post-Fordist (flexible) production paradigm and strong ties-based networking in the case of project-type work speed up the diffusion of telework. In the view of policymakers, telework is a new and individual form of work enabled by the use of ICT. Accordingly, government support relates to the creation of a new legal environment and to financial help to individual entrepreneurs (e.g. by offering subsidies to buy ICT equipment, organising ICT training courses for future teleworkers and giving wage subsidies for a certain period of time), but no visible efforts have been made to help entrepreneurs cope with various forms of organisational innovation (e.g. 'incremental' or 'modular' innovations) related to the relocation of business services or to the implementation of telework. More government efforts - both at national and regional levels - would be necessary to stimulate networking activities within the SME sector and between SMEs and large firms by developing 'project-type co-operation'.

This briefly-presented new policy approach calls for value-added partnerships based on interactions between business, educational-research communities and governments (Triple Helix) in order to identify the changing and fragile elements of the development

16 In Hungary, for the tender to develop network-type co-operation, organised by the Ministry of Economy and Transport, in 2003, only 2.4 percent of small and medium-sized firms made applications. Among them, only 1.5 percent were successful, representing only 4.8 percent of the resources devoted to develop network activities in the SME sector within the total budget targeting the development of the SME sector (Csák, 2004: 3).

opportunities and to help develop a better match between the demand and supply of the necessary skills and knowledge. This type of partnership of social and economic actors is often referred to as a 'strategic' partnership and is characterised by the continuous search of new paths of development which requires '... new forms of coordinating various innovation activities,... vision creation and discursive coordination as key elements of the new steering form of the transformation process' (Schienstock, 2004: 92).

In addition to renewing policy co-ordination, we also have to call attention to the challenges social scientists have to face when dealing with the diverse aspects of the new stage of development in the transformation economies of the NMS. To better understand the various elements of flexibility in both manpower and knowledge use, it would be advisable to integrate the dimension of the 'labour process' into our approach to a much greater extent in the future. Thus, the task structure and the ICT-related task structure may be better understood and evaluated if we pay special attention to the process of knowledge creation, transfer, etc., using tools such as the SECI-spiral (Nonaka, 1994). By identifying and characterising the conversion of various forms of knowledge (e.g. interactions between tacit and explicit knowledge), we may better understand the ICT-related task-structure and more realistically locate and improve the position of SMEs in different sectors of the economy (software and business and professional services).

In this respect, it is worth mentioning the experience of the ICT professional profile tested in the interactive media sector (within the framework of the STILE project),[17] where we 're-discovered' - in the case of web-developing activities - the same patterns of entrepreneurship development paths as in the old economy. A large number of micro-firms display what is called 'garage mentality' and prefer the 'low-road' version of development. The core aim of these entrepreneurs is to survive and keep employment - mainly as family-business - in the context of the fast changing economic and technological environment. Firms that have the ambition to produce high-quality, high-value added services - e.g. in the interactive media sector - represent the 'high-road' of development which may be contrasted with the 'garage mentality' mentioned above. These firms, establishing project-type co-operation, may become important national or even international actors. Due to the lack of empirical evidence on 'project-based firm' activities in the CE regions, the small and medium-sized firms in the New Economy sectors (e.g. interactive media) usually copy the internationally available - mainly American - patterns of organising these activities. These patterns, however, were created and used in a rather different socio-economic and cultural context. Our knowledge is limited on the labour processes of project-based firms. To overcome this knowledge deficiency, we have to focus our future research activity on the variety of 'project-based firms' with differing outputs and goals, characterised by fluidity or stability of knowledge use and development, having hetero-

17 The STILE project was set up with funding from the EU Information Society Technology (IST) programme, having such ambitious goals as updating the occupational classification (ISCO) to include eWork, developing a module for monitoring telework in the existing Labour Force Surveys, profiling ICT-related occupations, etc. (for further details, see http://www.stile.be). The co-ordinator of the Hungarian research team was Csaba Makó and the members of the Research Group for Sociology of Organisation and Work in the Institute of Sociology, Hungarian Academy of Sciences (http://socorg.socio.mta.hu/), dr. Judit Lakatos, head of division (Hungarian Central Statistical Office), Tamás Koltai, senior researcher (Hungarian Central Statistical Office), Éva Tót, senior researcher (Research Institute of Education, Ministry of Education).

geneous motivations of their participants, e.g. partner involvement based on short term (financial) interests versus long-term interests, trust, etc. (Whitley, 2004: 25-6.).

By identifying the patterns or a typology of skill conversion and skill identities, we may better understand the different development paths and the different institutional supports consistent with these models of development in organising business activities. International comparative studies could be an appropriate methodology for better understanding the special organisational-cultural and economic environments of SMEs and for identifying the variety of patterns of the 'low' or 'high road' of their development.

Appendix 1

Table A1.1 Foreign direct capital investment in selected economies in the CE region (in million euros)

Countries	2000	2001	2002	2003
Czech Republic				
Inward FDI	5,404	6,296	9,012	2,289
Outward FDI	47	185	219	206
FDI Balance	5,357	6,111	8,793	2,083
Hungary				
Inward FDI	7,998	4,391	3,026	2,182
Outward FDI	664	399	292	1,408
FDI Balance	7,334	3,992	2,734	774
Poland				
Inward FDI	10,334	6,372	4,371	3,756
Outward FDI	18	97	228	324
FDI Balance	10,316	6,275	4,143	3,432

Source: Csabai, 2004: 63

Appendix 2

eGap is an EU-funded IST research project aimed to understand the diffusion of telework, within special social-cultural and organisational contexts in the SME sector (http://www.egap-eu.com). The sample distribution by regions and size is illustrated in the following tables.

Table A2.1 Characteristics of the firms surveyed based on sample regions

Regions	Number of firms	Percentage
Emilia Romagna	500	29.2
Central Transdanubia	306	17.9
Greater West London Wedge	303	17.7
Rhône-Alpes	300	17.4
Tampere	305	17.8
Total	1,714	100.0

Source: Makó, Melles & Keszi, 2004: 3

Table A2.2 Size distribution of firms by the regions surveyed, percentage

Size of firms (number of persons employed)	Regions					
	Emilia Romagna	Central Transdanubia	Tampere	Greater Western London Wedge	Rhône-Alpes	Total
Micro (<10)	24.8	17.9	23.0	9.2	13.6	18.3
Small (10-49)	67.8	68.1	64.9	71.6	67.3	66.9
Medium (50-249)	5.0	14.0	12.1	19.1	15.3	12.0
Large (>250)	2.4	-	-	-	3.7	1.3
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: Makó, Melles & Keszi, 2004: 4

Appendix 3

The EMERGENCE project (Estimation and Mapping of Employment Relocation in a Global Economy in the New Communication Environment) was set up under the directorship of Ursula Huws with funding from the EU Information Society Technology (IST) programme to identify and measure the distribution of *e*Work. Various research tools were used (e.g. statistical analysis, 18-country employer survey, case studies, statistical modelling, etc.) to map the patterns of the new division of labour in the *e*Economy. Between 2000 and 2003, research partners in Australia, Austria, Belgium, Canada, Denmark, Germany, Hungary, Italy, Sweden and the UK, with associates and subcontractors in many other countries participated in this international project. Research institutes and partners participating in the EMERGENCE company case study research in the NMS were as follows:

- Hungarian team: Csaba Makó (Co-ordinator for the Central European region) Éva Bócz, Tímea Budai, Roland Keszi, Daniel Koval, Dániel Mester and Péter Tamási (Institute of Sociology, Hungarian Academy of Sciences, Budapest);

- Polish team: Marek Bednarski and Lucyma Machol (Institute of Labour and Social Affairs, Warsaw);
- Czech team: Jarka Koptikova and Martin Macha (Institute for Labour and Social Affairs, Prague).

Details on the project design and major steps are available on http://www.emergence.nu. Also see Huws & O'Regan (2001) and Huws (2004).

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